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THE IRON AGE

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JANUARY 5, 1939

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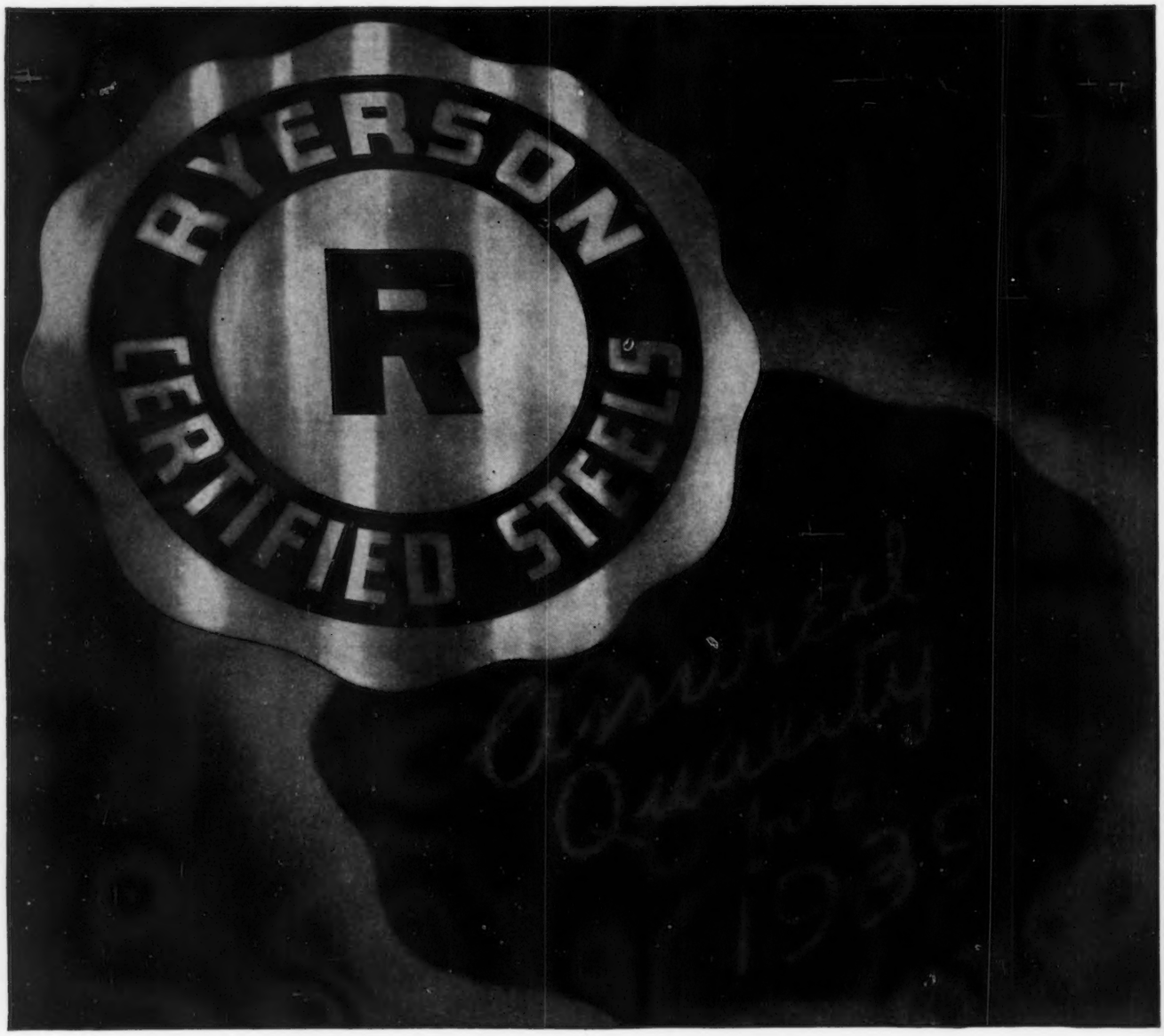

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RYERSON STEEL-SERVICE

The WORLD of TOMORROW..

THIS year of 1939 will be a crucial one for America. It will be a crucial year, particularly for American industry. A year that will put executive caliber and foresight to the test.

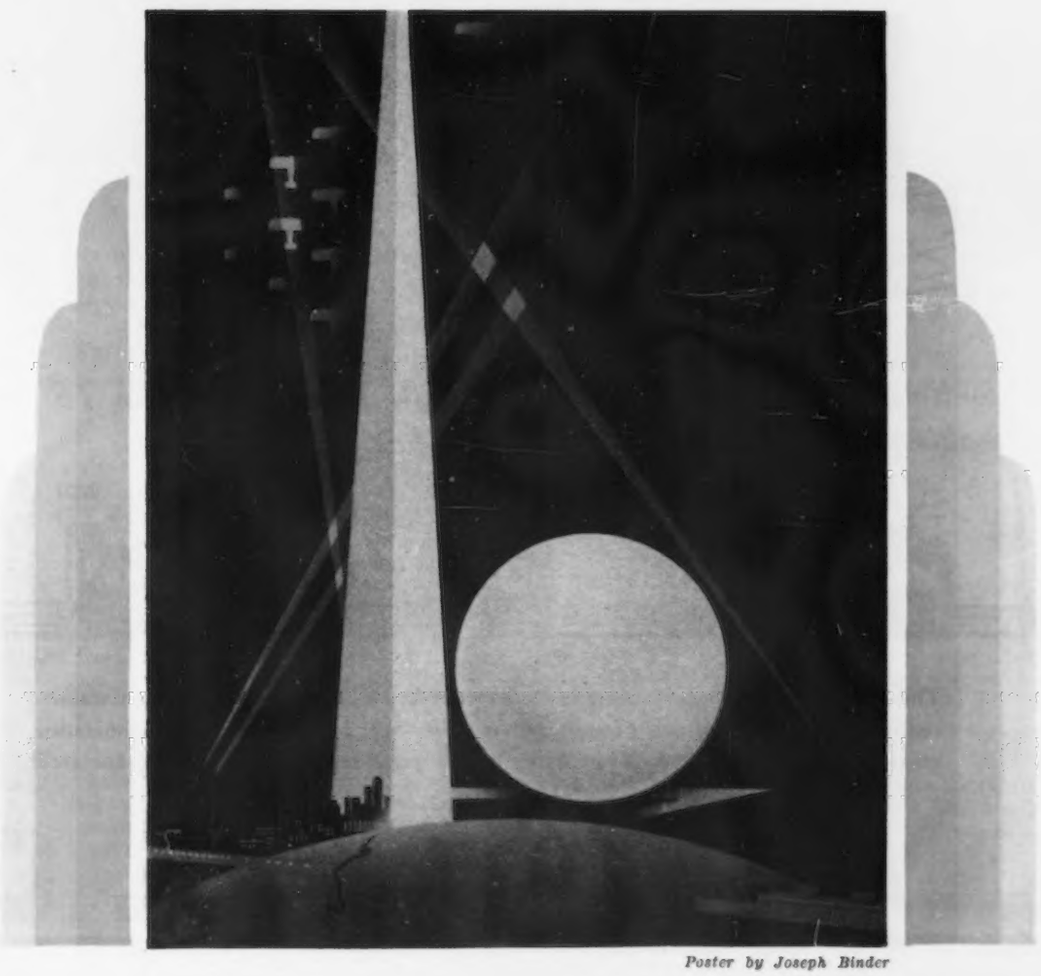
Foresight, during the months ahead, will serve us better than hindsight. The conditions surrounding business, producing a product and particularly of making a profit, have been altered so radically that the traditions and experiences of the past are no longer reliable guides to safe business conduct. These must now be more largely subordinated to ingenuity and vision.

We need vision today more than ever. We need to look forward to the World of Tomorrow and not backward to the World of Yesterday.

It is fortunate, indeed, that the New York World's Fair, with its inspiring keynote of the World of Tomorrow, is to take place this year. And it is appropriate too, that in this *Preview Number of* THE IRON AGE, in which we look forward rather than backward, we should also be able to present to our readers the first comprehensive pictorial preview of the Fair itself yet attempted on this scale.

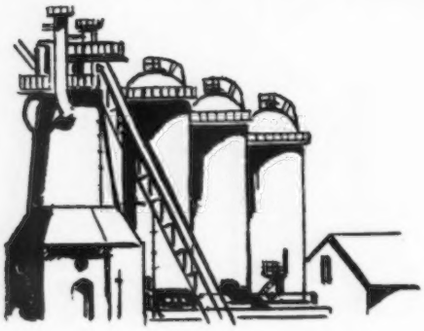
To the officials of the New York World's Fair, whose courtesy and cooperation have made this presentation possible, we extend thanks on behalf of our readers and ourselves.

John H. Van Deventer

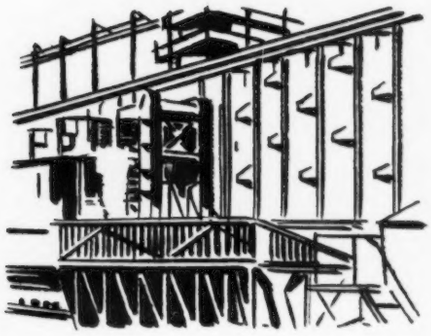


Poster by Joseph Binder

New Inland Facilities
For 1939 Customer Service
(COMPLETED DURING 1938)



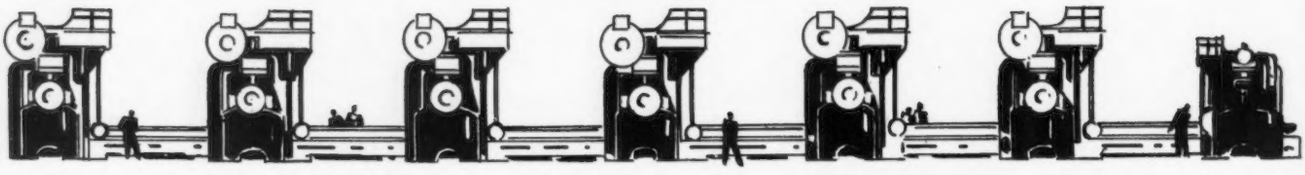
New 1,000-ton blast furnace for increased pig iron production



59 new coke ovens to supply more and purer fuel

Five new open hearths for 18% increase in steel-making capacity

New 44" continuous strip mill, now teamed with Inland's modern 76" continuous mill, for making better sheets and strip . . . Faster!



This added equipment with its many important new control features for maintaining uniform quality, plus the prompt personal service of the Inland's organization, gives you definite reasons for making Inland your regular 1939 source for steel.

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SHEETS STRIP TIN PLATE BARS PLATES FLOOR PLATES STRUCTURALS PILING RAILS TRACK ACCESSORIES REINFORCING BARS

What's in This Issue

AMERICAN industry, shackled by overgrowing Government controls, looks to 1939 with hope but with full realization that this year will be another period of momentous struggle. Already shorn of much of its power to regulate wages, hours and other cost factors, industry must center its efforts during 1939 on *productivity*. Along this path, concludes J. H. Van Deventer, editor-in-chief of THE IRON AGE, the metal-working industry can insure itself a fair profit margin. Mr. Van Deventer's appraisal is given in

"Profits in the Metal-Working World of Tomorrow"—Page 62

INDUSTRIAL leaders who do most to reduce costs of production in the new year by investigating, questioning, comparing, adopting new processes, and modernizing plant equipment, may find themselves among the makers of the nation's "industrial news headlines." During the last 12 months many leaders of industry made news throwing a white light on industrial progress to come in 1939, which will end a decade of depression. A few of the many business men who stood out as news makers in 1938 are pictured in

"Industrial News Headliners of 1938"—Page 65

WHAT 1939 holds in store for the metal-working industries is not wholly a matter of reading tea-leaves or gazing into crystal balls. Coming events in business, as elsewhere, often cast their lights and shadows before. Throwing caution to the winds, C. E. Wright, managing editor, and other staff members of THE IRON AGE forecast a 40 per cent gain in ingot output in 1939 and analyze the trend in

"Looking Ahead with Steel Consuming Industries"—Page 73

PART of the expected upswing in steel production next year will rest upon the Government's need for materials to defend the nation in a war-mad world. The New Deal may try to hide its failures by over-emphasizing dangers of war involving the United States. Yet most Americans will favor reasonable defense measures. What this may mean as a trade stimulant is described by James G. Ellis, associate Washington editor, in

"The Armament Program and the Capital Goods Industries" —Page 90

DANGERS from within far outweigh dangers from abroad in the minds of a growing number of Americans. In one of the most significant elections of this generation, the voters on Nov. 8 expressed this concern by calling for an end to "tax and tax, spend and spend, and elect and elect" Government. L. W. Moffett, the Washington editor of THE IRON AGE, who each week presents a shrewd appraisal of business and politics, tells industry what it may expect from the new Congress in

"The Legislative Carryover"—Page 96

SIGNS that the voters do not want the Senate and House of Representatives to become, either in name or fact, a "Congress for industrial organizations" were not lost upon John L. Lewis, the CIO leader. Mr. Lewis seems to have an opportunity, provided he can control the very real radicals in his organization, of building a permanent labor organization. During the last few months, however, the Communist sympathizers and other radicals among CIO leaders seem to have gained in power and influence, James A. Rowan, news editor of THE IRON AGE, decides in

"1939 Labor Relations Foreshadowed by 1938"—Page 100

FREQUENTLY in 1938 Mr. Lewis took part in agitation of the steel wage-price question in which the President himself joined. Not only the prices themselves but the traditional system of pricing steel was revised last year. A review of price developments which will affect industry in 1939 appears in

"Steel Prices and Steel Production in 1938"—Page 106

WITH prices of industry's products growing more subject to Government control, machine tool builders during 1938 engaged in a healthy competition in fundamental design which will benefit the metal-working industry during the coming year in its drive for profits. Frank J. Oliver, associate editor, discusses the results of this competition and its effect on the future in

"Trends in Metal Cutting Machines and Tools"—Page 114

MILLIONS of dollars can still be spent profitably in an untold number of American manufacturing plants to save tens of millions of dollars now wasted through inadequate material handling methods. Industry is far from the years of its infancy but mankind still is slow to realize that the use of muscle costs more than the use of the machine. Frank Juraschek, consulting editor, looks at this subject in

"Moving Materials Mechanically"—Page 122

NOWHERE is there more restlessness, more unwillingness to rest upon the accomplishments of the past, than among metallurgists and steel technicians. Concluding, for example, that the making of steel along the pattern of today is too costly, slow and unpredictable, T. W. Lippert, metallurgical editor of THE IRON AGE, takes a high dive into a profound subject in

"Progress Beckons to Materials and Metallurgy"—Page 128

SINCE the metallurgist alone cannot speed the metal-working world of today into the world of tomorrow, the sales, operating and other departments must do their share. Boards of directors and stockholders—owners of the business—must help find the road to a more economical production. T. C. Campbell, Pittsburgh editor of THE IRON AGE, believes that business controlled too strongly by tradition is "guided by dead hands." His analysis of the situation is entitled

"Steel Plans Its Future Realistically"—Page 134

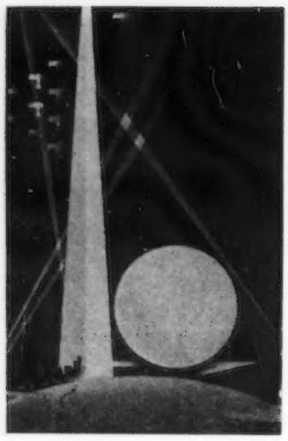
BECAUSE 10 per cent of industry's total cost of production, or two billion dollars, represents its annual bill for power, industry must be concerned with reducing power waste. Almost one-fourth of the power used by industry is considered waste according to a survey headed

"Putting Power To Work in 1939"—Page 140

PROSPECTS for the non-ferrous metals in 1939 can not readily be summed up in a few words; each has its own story. After a survey of the prospects, Adolph Bregman, consulting engineer, has decided that strongest hopes for expanded consumption of non-ferrous metals lie in building, and has arrived at other conclusions which he outlines under the title

"Non-Ferrous Metals on the March"—Page 146

PROFITS *in the* METAL-WORKING WORLD *of* TOMORROW



o o o

By JOHN H. VAN DEVENTER
Editor, THE IRON AGE

o o o

EVERY working part of every machine and every member of any structure is designed with a "safety factor". This ranges from 300 to 1000 per cent of the normal load and is for the purpose of preventing breakage.

Industry and business too have a factor of safety which is designed to keep them from "going broke". It is the profit margin. Overload a business concern with excessive costs for a long enough period and it will break just as surely as would an overloaded machine or structural part.

If it is important to design a machine or structure so that it will not break or collapse and to reinforce or add to its margin of safety when the load grows heavier, it is far more important and necessary to do this with our individual industries and businesses. Especially now, when the cost load is continually increasing.

The factor of safety which prevents a business from breaking is far more modest that that which engineers apply to parts and structures. It is not 1000 per cent nor 300 per cent nor even 10 per cent. From a study of all corporations in the United States over the period of 13 years from 1922 to 1934, inclusive, this margin of safety is shown to be barely 4 per cent. And that period takes in eight fat years and five lean ones.

The preservation of this exceedingly slight margin of safety, and its reinforcement if possible, is the most important job that this country has before it. Upon this job depends the major revenues of Government, the security of present workers in their jobs, the possibility of reabsorbing the unemployed in private industry, the standard of living of America and the perpetuation of the Constitutional democracy of free enterprise.

With so much of public and national interest at stake, it seems strange indeed that our Government officials, instead of concentrating their energies and the millons of public money at their disposal upon this vitally important task of aiding private enterprise to survive, should be progressively, though unintentionally, weakening and diminishing this safety factor week after week and month after month.

The Right to a Living Profit

We have heard much, from Washington and elsewhere, during the past six years of the rights of labor, extending even to its right to sit down in seized plants in defiance of law and of court orders. We have seen departments and bureaus of the administrative branch of Government tacitly turned into promotional agencies for a particular form of unionism. We have heard much about the obligations of both Government and business to the unemployed. We have heard about the obligation of establishing an annual wage and the desirability of profit sharing. But how much have we heard, from official quarters and Government spokesmen, about the prior right and necessity of a profit margin, not for the benefit merely of investors and owners but as a safeguard to the whole public?

That, gentlemen, is a responsibility that is apparently delegated exclusively to private enterprise and initiative and it will remain as such until the people of our country heed the fable of the Goose that Laid the Golden Eggs.

I have said that the average profits, after taxes, of our corporation is almost 4 per cent. This statement should have been made in the past instead of the present tense for the period covered in the 13 year statistical analyses ended in 1934. And since that time,

*First of a series of articles to appear through 1939.

indeed, since 1933, powerful forces have been at work which have seriously eaten away even that meager margin of safety.

Regimentation of Cost Elements

In the good old "horse and buggy" days, and indeed up until much later than that, most of the elements of cost were controllable by management. The only one that was not, taxation, did not amount to an appreciable percentage.

Little by little since that time, and continuously over the whole period, more and more control of the elements of cost has been taken away from management by the operation of legislation and other factors outside of management's direct sphere of influence.

Wages and hours, for example, have always been a principal element of cost. Formerly these were, to a large extent, controllable by management. Today, Government and labor unions have assumed the larger part of this control.

Overtime, in the past, has likewise been under the control of management. Today management has little to say about this important factor in the flexibility of operations required to meet the peak conditions that face all fluctuating demands.

Taxation, which in the past has been an insignificant portion of costs, has increased to the point where it is now one of the severest drains on the corporate pocketbook. Social Security taxation alone has put a tremendous financial burden upon industry.

All of these elements of cost have not only been taken away from the control of management, but in addition are piling up larger burdens of constantly increasing weight. Wages are to be progressively increased, hours progressively shortened by legislative fiat, and taxation will increase not merely with the growing powers of the Social Security mandate, but to make up for the alarming and continuing Government deficit.

Material Costs Will Rise Also

Materials are an important element of cost. While the prices of materials are not yet under Government regimentation, they are intimately affected by all of the cost-increasing factors mentioned above as having slipped, bit by bit, out of management's control. And today, even though we have not as yet reached a state of dictated price economy, these uncontrollable factors of cost are already dictating higher prices of materials on every side. These prices will continue to rise, adding still more to the heavy burden of management's uncontrollable costs.

This is a disturbing picture—a picture which deserves far more consideration and painstaking analysis than has been given it by most management executives. For, no matter how it has happened, nor who has been to blame for it, the picture is one of conditions as they exist today; of conditions that come close to hamstringing initiative in American industry. And these conditions are so stringent that they force us, whether we want to or not, to consider this final question:

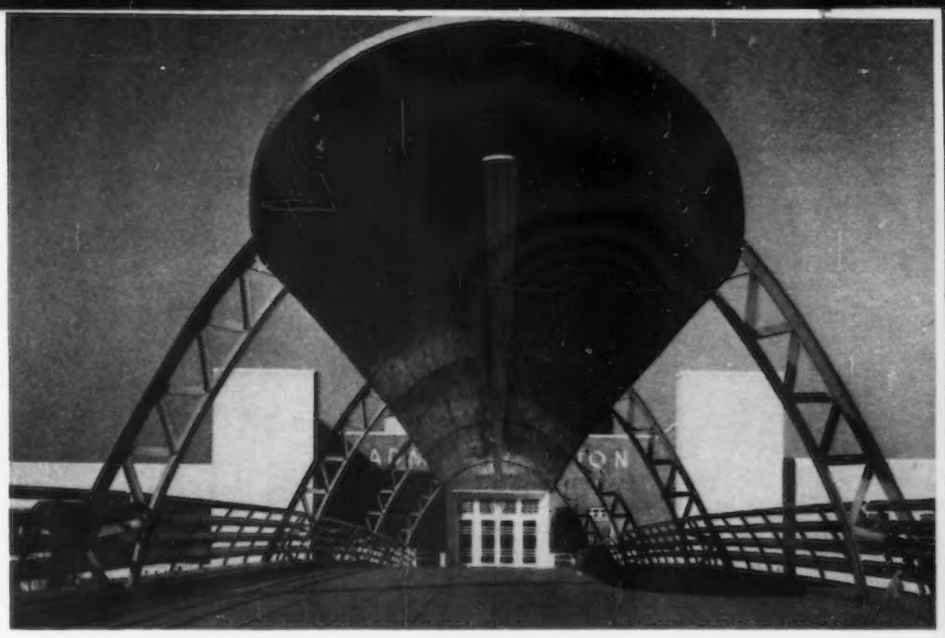
What Have You Got Left to Control?

With wages, hours, overtime, taxes and material costs out of management's control, what has it left to deal with in making, or in trying to make, a profit?

Just three things, namely: Prices, Interest Charges and Productivity.

Let's look at these one at a time.

Take prices first. Did you ever stop to think that *cost* of itself means nothing, and that likewise *price* of itself means nothing, but that it is



YACHT-LIKE in its lines is this "Bridge of Tomorrow" at the New York World's Fair, where it connects the Administration Building with the exposition grounds. Its hull, rails and abutment are finished in clear-varnished fir. The graceful steel supports are painted "New York City blue." o o o

ANOTHER view of the "Bridge of Tomorrow" is shown below. o o o

the relation or ratio of the one to the other that means everything in any business?

One of the most serious problems of management has arisen from the disruption of formerly accepted ratios of this character by New Deal legislation. For example, such ratios as that of wages to total cost, total cost to selling price, selling price to purchasing power—all of these ratios have been thrown out of gear by the events of the past six years.

Take the ratio of cost to price. Your costs have gone up. If you could raise your prices in the same proportion and thus restore the ratio which spells profit to you, the profit "margin of safety" could be restored. But you cannot do that, because purchasing power has not been increased in similar measure, and therefore a rise in your prices would mean less business. So the increased-price avenue will not let you out.

You cannot do very much more with interest on investment or on indebtedness unless you go through the wringer. And as for investment in inventory, most concerns have come down to a "hand to mouth" basis already.

Productivity Is Your Only Way Out

When all is said and done, all that industrial management really has left to control today is *productivity*. Production per man-hour or per wage-dollar. That is industrial management's one and only defense against all of the other uncontrollable and constantly increasing elements of cost. It is the one "out" left for profit-making. It is the one big subject that should and must be in the minds of industrial executives, first and foremost, during 1939.

Delay in coping with this problem of productivity will be dangerous in view of the times and their trends. For shadows of coming events are already being cast upon the crystal ball which portend efforts to take even this one remaining element of cost out of the hands of management.

Inconceivable? Then consider this statement: "Science and invention have been responsible for the depression and for unemployment in this country" Since science and invention have always been the parents of productivity, this is equivalent to putting the blame upon it for our recent and present misfortunes.

Of course we have heard such statements before. We have heard them from soap boxes and dismissed them as the ravings of men whose minds are synchronized with the thinking of pre-horse and buggy days or as the rantings of envious incompetents.

But when such a statement is made, as this one was, by Senator Joseph O'Mahoney, chairman of the President's Monopoly Investigating Committee, in a public address in New York a few days prior to the opening of his committee's hearings, management may well stop, look and listen. For this committee is scheduled to sit in judgment upon American industry and business for the next two years. And such a prejudging of productivity, by its chairman, before a single line of testimony is heard, does not augur well for the fullness or fairness of the hearings to come nor for the fate of the defendant. It is the French system of jurisprudence applied in America with New Deal improvements. In France, the defendant is assumed guilty unless he can prove his innocence. In this investigation, he may not even be given a chance to prove that!

Unless this grandiose two year inquisition dies from malnutrition of public interest—which is a fair possibility—there is the alternative possibility that two or three years from now you may have to secure a permit from a Permanent National Resources Committee before you are permitted to buy an improved machine tool or substitute a conveyor for a wheelbarrow.

It can't happen here! But you would have said that five years ago about a Federal Wages and Hours law or about the unionization of Detroit, or about the possibility of being ordered by the Government to reinstate, with back pay, strikers who destroyed your property and went to jail for it. All, all of that and more has happened here.

If the time should come that American productivity is compelled to wear a muzzle and a license, and spend its time in the dog house, the concern which has taken advantage in the interim to bite chunks out of cost will have an advantaged competitive position. And even should such restrictions not eventuate, such a concern will still be ahead of its less progressive or less able competitors.

This year, the keynote of executive attention should be "Life saving through cost saving". It should be a year of investigation, of questioning of operations and processes, of replacement and modernization of equipment. There is a time to save and a time to spend, a time to sow and a time to reap. And this year is the time to spend and sow so that you may insure a profit margin of safety in the metal working world of tomorrow.

The wise hunter gets his birds during the open season.

THIS great stainless steel hemisphere, 66 ft. high and 132 ft. in diameter, will house two floors of exhibits by the United States Steel Corp. and its subsidiary companies. A striking architectural feature of the building is the use of the structural steel members on the exterior as a basic element of design. These will be painted blue, while other details will be accented in red.

L. E. BLOCK

. . . Inland Steel Co., of which Mr. Block is chairman, found itself during much of 1938 an outstanding victim of Labor Board vagaries. The NLRB once backtracked on an "order" to Inland, then came back with another decision (cheered by the CIO)

A. G. BRYANT

. . . With prospects that industry will be busily retooling in 1939, for peace or war, the Bryant Machinery & Engineering Co. executive was lifted into leadership of distributers belonging to the Associated Machine Tool Dealers of America

GEORGE H. BUCHER

. . . Cable winders for Westinghouse Electric & Mfg. Co. scoff at politicians who say that America is no longer a land of opportunity. One of them (1909) last year rose to the presidency of the company. He is George H. Bucher

WILLIAM J. DAVIDSON

. . . As the S.A.E.'s new president, Mr. Davidson, General Motors Corp. Executive (Winston Engine division), finds technical men broadening their interests to include many subjects such as the "effect of the machine on employment"

INDUSTRIAL NEWS H

H. E. LEWIS

. . . To meet the quickened tempo of changing conditions in steel, Jones & Laughlin Steel Corp. already had chosen him as chairman. Last February he also took over the presidency, becoming one of the few two-job top executives in the industry

SYDNEY G. McALLISTER

. . . Annoyed by FTC allegations regarding a farm equipment monopoly, International Harvester Co.'s president early in July characterized the Commission's action, similar to other New Deal business-baiting in 1938, as "witchburning"

HUGH MORROW

. . . The president of Sloss-Sheffield Steel & Iron Co. warned the Public Contracts Board (July) that its wage actions might "disrupt the economic life of the South," a place that has recently been referred to as this nation's Problem No. 1

MARSHALL POST

. . . When the American Foundrymen's Asso ciation members looked each other over t select a new 1939 president, the honor went t Marshall Post, who is also vice-president o the Birdsboro Steel Foundry & Machine Co

AL NEWS HEADLINERS of 1938

WILLIAM J. DAVIDSON

. . . As the S.A.E.'s new president, Mr. Davidson, General Motors Corp. Executive (Winston Engine division), finds technical men broadening their interests to include many subjects such as the "effect of the machine on employment"

RAOUL E. DESVERNINE

. . . Legal complexities of doing business in the America of the 1930's helped elevate him to the presidency of Crucible Steel Co. of America, following a lawyer-executive tradition which includes such names as that of the late Judge E. H. Gary

W. F. DETWILER

. . . Once an Allegheny Steel Co. time card employee, Mr. Detwiler rose to head that company, to unite it with Ludlum, to direct the resulting merger, one of 1938's largest, as chairman of the new Allegheny Ludlum Steel Corp.

BENJAMIN FRANKLIN FAIRLESS

. . . A native Ohioan with no inborn liking for commuting, Mr. Fairless in 1938 became the first U. S. Steel Corp. president in recent years to work (his office is in the Koppers Building, Pittsburgh) within a few miles of some of its largest plants

HENRY FORD

. . . Despite an exposure to the Roosevelt charm in a face-to-face talk (May) with the President, the automobile maker said: "If the Government will just get out of the way and give natural American enterprise a free swing it will do the job"

A. E. GIBSON

. . . A treatise by Mr. Gibson, president of Wellman Engineering Co., Cleveland, on "Commercial Welding" won for him and a co-author (his wife) the grand award of $13,941 in the James F. Lincoln Arc Welding Foundation's $200,000 contest

TOM MERCER GIRDLER

. . . Angry radicals find the American Iron and Steel Institute president grows less and less satisfactory as a target. Meanwhile Mr. Girdler waits for public opinion to come around to his viewpoint regarding Washington demagoguery

INDUSTRY'S struggle to preserve the American system of free enterprise against powerful domestic enemies overshadows all else in the history of business for 1938.

Nevertheless, engineers continued to develop new machines and new processes, and laid plans for new industri Managers of factories sought new markets for their pro ucts, and step by step sought to work out peaceful agre ments with employees who sometimes had been goaded greedy radicals and politicians.

MARSHALL POST

. . . When the American Foundrymen's Association members looked each other over to select a new 1939 president, the honor went to Marshall Post, who is also vice-president of the Birdsboro Steel Foundry & Machine Co.

FRANK PURNELL

. . . Good-naturedly tilting with the LaFollette Civil Liberties Committee, the president of Youngstown Sheet & Tube Co. said: "I just don't believe in undercover activities or labor espionage. I don't think it serves any useful purpose"

ALFRED PRITCHARD SLOAN

. . . Meeting in part, for General Motors Corp. employees, the desire all men have for "more security," Mr. Sloan made history (November) by announcing a wage plan guaranteeing most employees a certain income for 1939

W. P. SNYDER, JR.

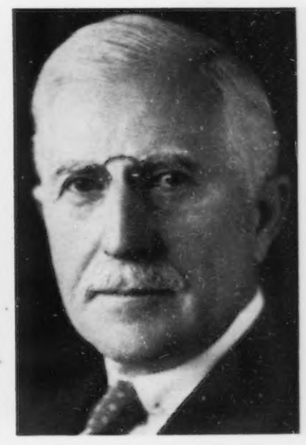
. . . Few business men in these turbulent years see their companies reach 50 years in age, then press onward to new usefulness. One of the few is the head of the W. P. Snyder ore and pig iron interests, Pittsburgh (1888-)

EDWARD R. STETTINIUS

. . . Exhibiting through 1938 a lively interest in industry's obligations to society, U. S. Steel Corp.'s chairman only last month warned reactionaries: "No longer can industry plow a single furrow toward a strictly commercial objective"

MYRON CHARLES TAYLOR

. . . His desire to balance "experience with enthusiasm" through infusion of new blood led Mr. Taylor to displace himself as U. S. Steel chairman in favor of Edward R. Stettinius, Jr., appoint Benjamin Franklin Fairless as chief administrative officer.



GEORGE MATTHEW VERITY

. . . Choosing to look at life by decades, not by 12-month periods, American Rolling Mill Co.'s chairman forecast that air-conditioning may outstrip the automobile by 1948. On April 21, surrounded by friends, he celebrated 50 years in steel

TOM MERCER GIRDLER

. . . Angry radicals find the American Iron and Steel Institute president grows less and less satisfactory as a target. Meanwhile Mr. Girdler waits for public opinion to come around to his viewpoint regarding Washington demagoguery

EUGENE G. GRACE

. . . Emphasizing the cooperative nature of industry, the Bethlehem Steel Corp. president reminded his employees that company's public relations (its good name) was their concern as well as the concern of the management

JULIUS P. HEIL

. . . Told that business men should run for office, the president of the Heil Co., Milwaukee, trounced Philip F. LaFollette for Wisconsin's governorship, invited industries driven out by radical legislation to "come back home"

CHARLES R. HOOK

. . . Frequently in 1938 the president of the National Association of Manufacturers carried industry's viewpoint to the nation. On Dec. 7 he said: "Once again . . . American people are willing to give free enterprise an opportunity to prove its case . . ."

DR. FRANK BALDWIN JEWETT

. . . To this A. T. & T. Co., vice-president (also president of Bell Telephone Laboratories) went the 1939 John Fritz gold medal awarded for "notable achievement in furtherance of industrial research, development in communication"

CHARLES FRANKLIN KETTERING

. . . He denounced (June) the "economic perpetual motion" sought by politicians whose heads (sometimes feet) are frequently firmly planted in the sky, frequently expresses his faith in his country's progress, saw new industries in years ahead

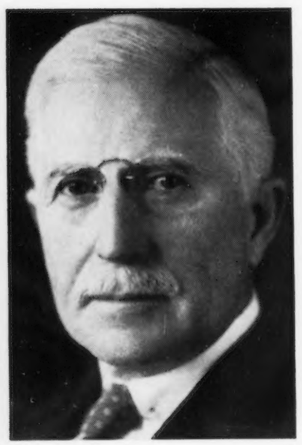
B. H. LAWRENCE

. . . One of the important engineering positions in American industry is, naturally, that of the chief engineer of United States Steel Corp. Mr. Lawrence made news among technical men when, in January, he was appointed to that post.

cesses, and laid plans for new industries.
ries sought new markets for their prod-
ep sought to work out peaceful agree-
es who sometimes had been goaded by
d politicians.

While industry was forced again and again to sell itself to the public and to fight off the attacks of critics often advocating introduction of alien methods into our Government, leaders of industry found time for other significant accomplishments.

What industry did in 1938 has a bearing on 1939 and the years to follow. What it did was Big News. Some of the men who made big industrial news last year are here pictured by THE IRON AGE (in alphabetical order) as "Industrial Headliners of 1938."



GEORGE MATTHEW VERITY

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WALTER F. WAGNER

. . . Under leadership of Mr. Wagner (of Ford Motor Co.), its president, the American Society of Tool Engineers has launched a national survey to determine the effects of modern machines on employment and our standard of living

CLARK C. WALES

. . . Engineers noted with interest in 1938 that Clark C. Wales, assistant general manager of the Algoma Steel Co., Sault Ste. Marie, Ont., was elected president of the Association of Iron and Steel Engineers

DAVID A. WALLACE

. . . Inventor of the Superfinish technique, the president of Chrysler Corp.'s sales division, last year gave industry an entirely new conception of what is commercially obtainable in the way of a refinished surface finish

ERNEST TENER WEIR

. . . Fighting political domination of business, the National Steel Corp. chairman freely blamed President Roosevelt's policies for the 1938 depression, declared (February) that what U. S. needs most is a pledge the U. S. system will stay

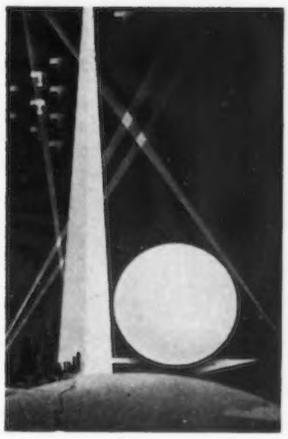
WENDELL E. WHIPP

. . . The president of Monarch Machine Tool Co. twice figured importantly in 1938 industrial news: (1) when he applied flame hardening to lathe bed ways for the first time, (2) became president of the National Machine Tool Builders Association

L. A. YOUNG

. . . Blaming progress by political demagogues in stirring up class hatred in the U. S. on ignorance, L. A. Young Spring & Wire Co.'s chairman graphically reminded employers and employees that 84c. of each $1 produced by industry goes to workmen

LOOKING AHEAD *with our* STEEL CONSUMING INDUSTRIES



ASSUMING a more favorable background for business in 1939, with no fresh shocks from either foreign or domestic political disturbances, there should be fairly substantial gains in many lines of activity that contribute to the iron and steel and related industries.

Steel ingot production in 1938 was about 28,500,000 gross tons, including electric and crucible. Actual consumption of steel last year was, however, larger than this amount, as there was a considerable carryover from 1937 production. There is no way of estimating the amount of this inventory that was consumed in 1938, but it was sufficient to depress steel production to an exceptionally low level during the first several months of last year. While heavy inventories were not the sole reason for this depression, they were an important factor.

At the beginning of 1939 inventories are of normal size and in many instances below normal. Production at the moment is very largely for immediate use. During the fourth quarter of the past year the industry produced ingots at an average rate of about 40,000,000 tons a year. This was without benefit of even a fair volume of orders from such important steel consuming channels as the railroads, the oil industry and users of tin plate.

Outlook Improving

Expectations for 1939 steel business are that most steel consuming lines will do as well as in the fourth quarter of last year and that some of them will do much better. While no boom is envisaged even by the most optimistic, it is regarded as fairly certain that 1939 will outdo 1938 by a very fair margin. In all probability the first half will be better than the last half unless by mid-year private undertakings should have made up some of the slack that must inevitably follow a slowing up of Government spending.

One of the least predictable features of 1939 business prospects lies in the railroad situation. While it is freely admitted — and the facts and figures speak for themselves—that many of the railroads will eventually be in need of extensive rehabilitation programs, they have been able to stave off such expenditures during their periods of depression; whether they undertake large buying programs during 1939 will depend primarily on these factors: Their own earnings, the trend of carloadings and the kind of Government aid, if any, that is provided by Congress.

From a steel tonnage standpoint too much should not be expected from any further armament program that Congress may authorize. The steel industry will benefit less than the machine industries that are called upon to do much of the high-grade precision work that is required in many of the items that would be purchased for the Army and Navy. Even though the naval and merchant marine shipbuilding programs will take fairly large tonnages of steel in the aggregate, the time required to build a ship spreads the steel rollings over a considerable period, so that this business will create no pressure on steel mills.

Steel Output Gain Expected

Any calculation of the probable volume of steel business in 1939 should be qualified by an if—if normal trends are not seriously disturbed by outside influences. If there is war in Europe, predictions would go awry. Hopeful expectations for this year are also predicated on the possibility that a policy of moderation will be followed in Washington.

Basing our predictions on known factors and with a feeling of hope that some of the unknown factors may turn out better than can now be safely counted upon, it seems probable to us that 1939 steel ingot production will total at least 40,000,000 gross tons, approximately a 40 per cent gain over 1938.

If some unlooked-for psychological factor is introduced into the situation, such, for example, as a rise in steel prices during the year, some speculative buying would result and some dormant projects might be rushed into the market, thereby boosting production further than would be likely in a stable market.

The outstanding unfavorable factor in the situation today is that much of the present activity has been artificially stimulated. If developments, politically and otherwise, are such as to give further confidence to private en-

terprise, steel business could conceivably improve more than the 40 per cent visioned in our present calculations.

It can reasonably be argued that steel consumption over the past few years, despite the boom in 1937, has averaged below what might be considered the normal requirements of the country. Taking 1937 and 1938 production together, the monthly average has been only about 60 per cent, which is below the average of so-called normal periods. Deficiencies in many lines are being built up, thereby pointing to much larger steel production at some future time when fundamental conditions have returned to a sound basis.

Analyses of the outlook in various important steel consuming channels, prepared by various members of THE IRON AGE editorial staff, follow.

Managing Editor

AUTOMOTIVE . . .

AS a steel consumer and as a factor in the general economic picture, the automotive industry promises to maintain an important position during 1939. During the final quarter of last year it played its familiar and potent role in stimulating the steel trade and other branches of American industry.

Estimates of demand for 1939 model cars vary somewhat but are surprisingly in general agreement, considering that individual executives and corporations must necessarily have different outlooks. The great majority set 25 to 35 per cent as the probable increase in production and sales; two producers with expanded lines forecast their individual gains about 50 per cent over last year.

In the 12 months ended Sept. 30 (which roughly represented the 1938 model year), production was 2,704,992 units, according to the Automobile Manufacturers Association; thus we should set the probable 1939 model output at close to 3,500,000—optimistic anticipation is 4,000,000 or better.

Looking a little further ahead, Alfred Reeves, vice-president and general manager of the AMA, predicts that reciprocal trade treaties and improvement in economic conditions generally will bring again the time when the auto industry will turn out 5,000,000 cars as it did in 1929 and 1937.

As an indication of 1939 prospects, the last three months' production is a barometer—it will total up to better than one million cars, compared with only a million and a quarter during all the rest of the year.

If the present average rate of production can be maintained through the first half of the new year, and that is a reasonable probability, the 3,500,000 mark will be reached. Sales and business conditions during the closing months of this series production, after July 1, undoubtedly will be the final measure.

The goal that has been set is a reasonable one. On the basis of registration figures for the past dozen years, a projected domestic sales figure of 3,000,000 (the rest of production being for vehicles not registered in the United States) is just on the better side of the 12-year average.

To meet this goal, production probably will maintain its 100,000-a-week level through January, may dip after dealers are supplied and back orders completely filled about mid-February, but will rise sharply through the spring months to a peak that should carry through June, with the usual seasonal effects and new-model virus being felt after that.

A STRIKING mural decoration by Andre Durenceau on the Metals Building at the New York World's Fair shows the spectral colors of seven metals and the sun on a semi-circular panel, 270 ft. long by 25 ft. high. It is an arresting example of the functional use of decoration. The material used is rubber base paint. . . .

Truck Production May Spurt

It is freely predicted that truck production, which has suffered greatly, is destined to show the greatest percentage increase as the industry's output moves into higher brackets. During the past year there have been notable improvements in trucks. More efficient, compact and versatile units are being offered today than a year ago. Predominating in the latest model offered are diesel power plants made by several manufacturers and cab-over-

engine trucks which provide longer bodies without greater wheelbase.

Rumors of impending introduction of new midget cars to sell at low prices prevailed last year but were effectively squelched when such cars failed to reach the market. Such projects are getting some attention, mostly outside the industry, but it is a matter of fact that the used car business, which is said now to gross about two billion dollars a year, acts as a floor under new car prices. At least the auto industry feels certain that the average American prefers for his dollar a powerful and comfortable used car to a less speedy and less powerful midget auto which would sell at the same price new.

Technical progress is unfolding plans which promise to have an important effect on auto markets—particularly on used car markets. It is apparent to those closest to the automotive scene that the industry is nearing the day when it will make an extra effort to build many more miles of trouble-free service into each vehicle. Before the Society of Automotive Engineers in December an internationally known designer pointed the way to engines which would require no adjustments, except possibly once a year or after 25,000 or 30,000 miles of operation. In another case, the research division of plant which serves the industry has had an engine in operation, on test, for three years to demonstrate that adjustments are virtually unnecessary and accessory replacement an evil that can be almost eliminated. Moreover, D. A. Wallace, of the Chrysler Corp., who during the last year has made industry extremely conscious of the merits of fine surface finish, predicts that by removing the basic causes of wear in engines and other moving parts it will be possible to operate up to 100,000 miles without repairs. This will amount to doubling car life, by present standards.

Within the industry there seems to be no fear that increased car life will affect new car sales. Periodic new models will continue to be the incentive for one-third of the car-owning population to buy new cars. The traded-in car will have more potential mileage in them and will therefore have greater resale value. A large part of the population will find cars it can afford to purchase and operate economically, more people will own cars, and the bogie of saturation is pushed away again.

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VIEW along Communications Plaza, showing the intricate steel work of the 200-ft. Perisphere and the 700-ft. Trylon or needle, before the application of exterior coating. Visitors to the exposition will tour the inside of the great ball on a "magic carpet" high in the interior, where a magnificent spectacle will be presented in interpretation of the Fair's theme, "Building the World of Tomorrow."

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CONSTRUCTION . . .

BARRING the possibility of a European war, and assuming that the November elections will have a moderating effect on future Federal legislation, it is fairly certain that a moderate, yet definite gain in construction activity will be made in 1939. An estimate by the F. W. Dodge Corp. fixes the gain at 8 per cent over the 1938 volume. This would mean that the volume of construction contracts placed in the year will total $3,500,000,000, as compared with $3,240,000,000 in 1938. Most of this improvement, it is believed, will come through a sharp increase in private building, particularly in the industrial and commercial building classification. The total of private construction contracts for 1939 may be about $1,900,000,000, or 25 per cent higher than the 1938 figure. Public construction, on the other hand, will be in smaller volume in 1939 than in the past year, perhaps as much as 10 per cent less.

Public Work a Major Factor

Although the current Federal pump priming program is scheduled to fade out of the picture by mid-year, public construction will unquestionably be a major part of the 1939 picture as it

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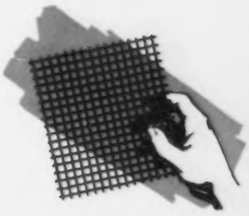
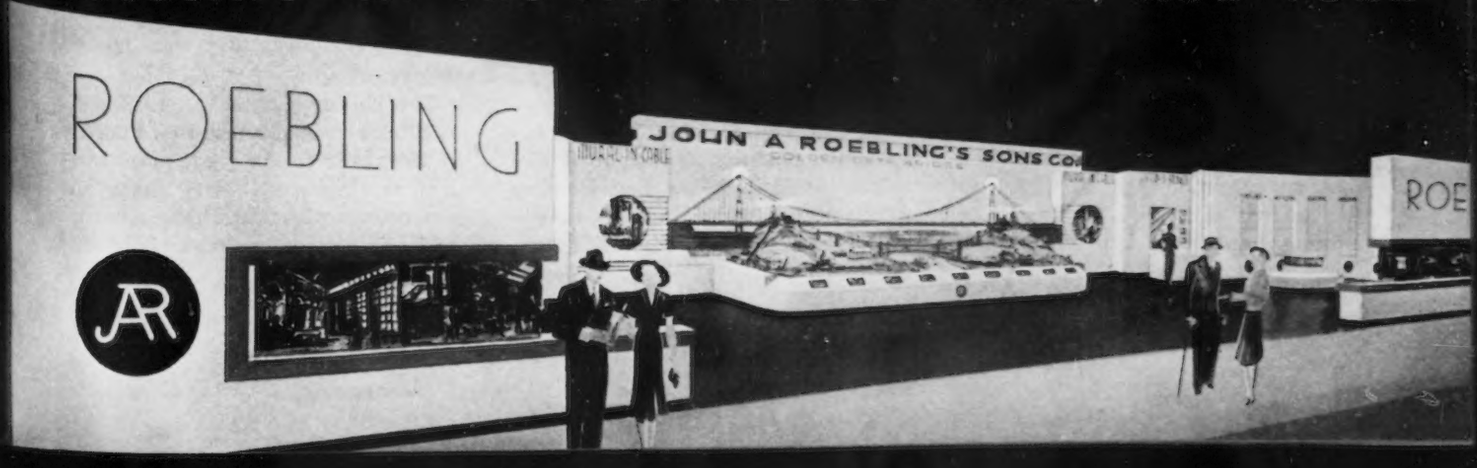


WIRE FABRIC

ROEBLING—AT THE 1939 WORLD'S FAIR, NEW YORK



was in 1938. In the latter year the value of public contracts was equal to 53 per cent of all construction. In 1939 it will probably dip to 45 per cent.

The importance of Government building in the past three years is further emphasized by data collected by the American Institute of Steel Construction, which show that this type of work accounted for 52 per cent of fabricated steel sales in 1938, as compared with 40 per cent in 1937 and 49 per cent in 1936.

In the early part of 1939 public works will probably continue to account for over half the structural steel industry's sales, tapering gradually to an average of perhaps 40 per cent for the year.

By the nature of the mechanics of the production and consumption of structural steel, rolling schedules do not react immediately to changes in the dollar volume of awards. On an average, two months elapse between the allotment and the rolling specification of the required steel by the contractor. In the case of large projects shipments are extended over a period of time. Thus it is evident that the effects of the Federal program will be felt by the steel industry for some time after allotments cease. This is borne out by the reports of the American Institute of Steel Construction covering shipments and bookings of structural steel. While bookings in 1938 rose from a low of 57,144 tons in February to a high of 137,642 tons in October, shipments advanced only slightly from 81,161 tons to 95,205 in the same period.

A private checking of PWA jobs for which funds are available indicates that between 750,000 and 1,000,000 tons of structural steel is to be placed with fabricators and mills during the next several months.

Large Projects Increasing

Large public projects are growing in importance. In 1938, according to the institute, jobs involving between 1000 and 10,000 tons accounted for 37 per cent of the year's bookings. Judging from the large number of housing projects, bridges, elevated highways, etc., which are being planned at the present, this tonnage classification will probably take a still larger share in 1939.

The construction of private houses, which has lagged so sharply since 1934, took an encouraging upward turn in the last half of 1938. If industrial operations continue to improve through 1939, this upward movement should be accentuated. The Federal Housing Administration reports that mortgage commitments in 1938 totaled about $650,000,000, against $447,500,000 in 1937, and predicts that a gain of as much as 25 per cent can be expected in 1939.

Low Cost Housing Gains Headway

The other phase of housing, the large, low-rent type project, is gradually gaining headway. In the 13 months of its existence, the United States Housing Authority has allotted $647,575,000 for work of this nature in 155 communities. Over the past six months considerable private interest has been aroused in this type of housing construction. The present year should see more intense participation on the part of private enterprise in this field. The significance of this construction activity to the steel industry is indicated by the 50,000 tons of structural steel that was required for the housing project in New York sponsored by the Metropolitan Life Insurance Co.

Prefabricated steel houses have shown much progress over the past year, but there is little in the immediate outlook to suggest that this outlet for steel products will expand to important size in 1939. Numerous problems, notably that of distribution, must yet be solved before this field will develop into an important steel consumer.

RAILROADS . . .

DURING the period from 1926 to 1937 inclusive, freight car purchases averaged 42,850 cars a year, while the retirement of cars in that period was at an average annual rate of 103,817 cars. This discrepancy between cars installed and cars retired has created a need for new cars to the point where it is now estimated that 100,000 cars a year would have to be installed to provide sufficient rolling stock to handle a sustained volume of 800,000 carloads of freight a week. An 800,000-car volume is not beyond achievement in 1939 if business improves to a level comparable with that of the midsummer of 1937. As a matter of record, the 1937 weekly average, 731,000 cars, was not far from this level. In 1929 weekly carloadings were far in excess of this 800,000-car total, averaging as they did over 1,000,000 cars weekly.

To build these 100,000 cars a year would require approximately 225,000,000 man-hours. The material would aggregate 1,400,000 tons of rolled steel, 265,000 tons of cast steel and 300,000 tons of cast iron wheels a year.

It is generally agreed that some sort of Federal aid will be necessary if the railroads are appreciably to improve the condition of their track and rolling stock in 1939. Because they went along with the President's mediation board in withdrawing its request for a 15 per cent pay cut, the carriers have reason to expect at least a favorable attitude from the Administration.

Government assistance is sought only for the short term. For the long range period, it is neither asked nor wanted. Freedom to manage its own affairs and relief from excessive and unreasonable taxation and regulation are all any road desires for the long run. Improved general conditions already have had a favorable effect on railroad earnings, and, when business gets back to normal, there is reason to believe that the roads could meet their current obligations, purchase needed equipment, and show a profit.

Net operating income controls volume of railroad purchases. *Railway Age* estimates 1939 net income will be $610,000,000 and that buying from manufacturers will at least equal that amount. Though far below 1937, this figure is much higher than 1938 and is about equal to 1936.

All roads are badly in need of new cars, new power, new track. At least 42 per cent of the freight cars and 40 per cent of the passenger cars now in service are over 20 years old.

The closing months of 1938 indicated a revival of interest on the part of the roads for new equipment, orders or inquiries having been announced for about 5000 cars. Buoyed up by increasing traffic, and the ex-

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THE building being erected by the General Electric Co. to house its exhibits which stands on a 68,399 sq. ft. plot, will feature three general sections, one devoted to product display, one having a "house of magic" auditorium, and Steinmetz Hall, in which 10 million volts of artificial lightning will be generated and discharged in spectacular fashion for Fair visitors.

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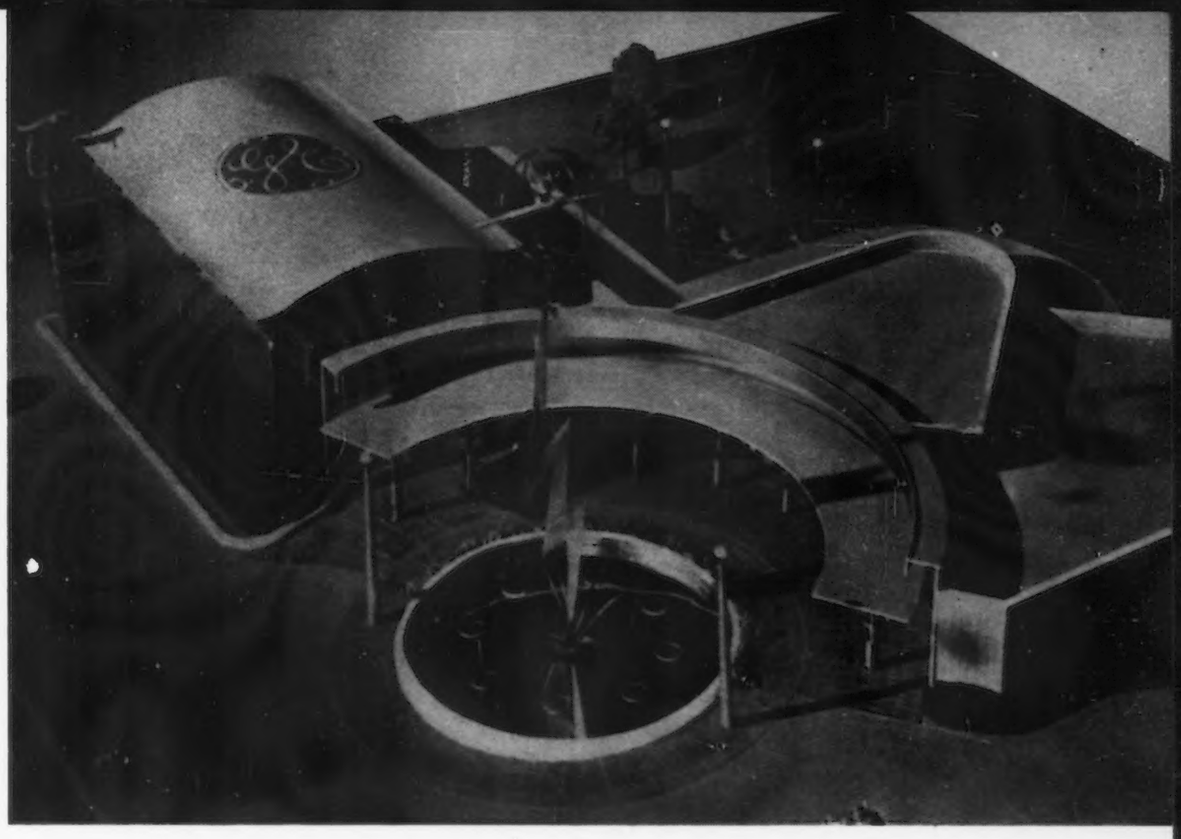


pectation of further general improvement, and Federal help of some kind, the railroads are moderately cheerful as they enter 1939. Barring unforeseen adverse legislation or a sudden reversal in the business upturn, the roads should improve their net earnings position and increase their purchases of equipment and materials in the coming year.

SHIPBUILDING . . .

SHIPBUILDING, naval and commercial, is the one most dependable source of business in 1939 for steel and machinery manufacturers. While the steel requirements for hulls and superstructures are often given the most emphasis, the ramifications of ship requirements extend the benefits of shipbuilding programs to many lines of industry, and many of these subsidiary needs are of indirect benefit to steel and machinery companies.

The program of the United States Maritime Commission for the construction of merchant ships and that of the Navy Department for naval ships have received much publicity, but a recapitulation may be informative as to the work that will probably be carried out during 1939.

The Maritime Commission's long-range program contemplates the construction of 500 ships over a 10-year period at a rate of about 50 ships a year to cost $1,250,000,000 in all, or about $125,000,000 a year. The 1939 program will run somewhat ahead of the 50-ship yearly average as it contemplates the awarding of a total of 55 ships to cost about $158,000,000. These are 12 tankers, three passenger liners, four P-2 combination passenger-cargo ships, 12 C-1 cargo ships and 24 C-3 cargo and combination cargo-passenger ships. The total estimated steel requirements for these ships is 259,760 tons.

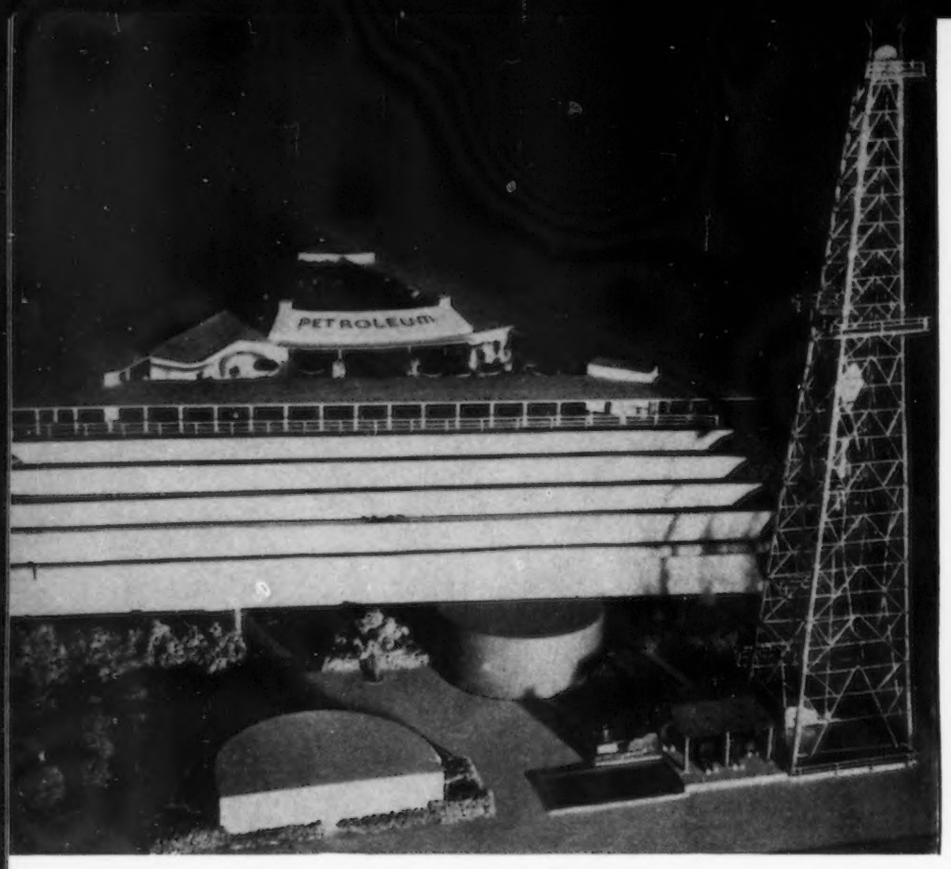
Up to Dec. 20, 1938, contracts had been awarded for 50 ships, some of which will be launched in 1939 and others will not be completed until 1940 and 1941. Steel for these ships, whose requirements total close to 200,000 tons, will be a part of the steel industry's 1939 backlog.

Shipbuilding companies which are beneficiaries of the Maritime Commission's program thus far are the Federal Shipbuilding & Dry Dock Co., the Newport News Shipbuilding & Dry Dock Co., the Sun Shipbuilding & Dry Dock Co., the Tampa Shipbuilding & Engineering Co., and the Sparrows Point and Fore River shipyards of the Bethlehem Steel Co.'s shipbuilding division.

Although the primary purpose of the merchant ship program is to provide for the carrying of a large part of our foreign commerce in American ships, there is also a national defense angle. "Without an adequate merchant marine to serve as its auxiliary our Navy would be nearly paralyzed," said Thomas M. Woodward, vice-chairman of the Maritime Commission, recently.

The Navy Program

Events abroad have forced the United States to revise upward its naval shipbuilding plans. Some contracts have already been awarded, notably for four battleships. The complete program may not be definitely known until recommendations of the President and the Navy Department have been acted upon by Congress, but the Navy already has received appropriations for 13 ships—four battleships, one aircraft carrier and eight cruisers. These appropriations were $138,063,150 provided for in the 1939 Naval appropriation bill plus $16,050,-



THE unusual triangular-shaped Petroleum Industry Exhibit Building at the New York World's Fair 1939. Part of the display to be made is the process of drilling for oil demonstrated by means of the derrick, shown at the right of this photograph of a scale model of the structure. This is one of the largest industrial displays at the Fair, situated on a plot 64,899 sq. ft. in area.

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000 contained in the so-called deficiency bill.

If further appropriations are obtained, the full program for 1939, as at present indicated, including the ships for which authorization has already been received, will be approximately as follows:

Four battleships, two aircraft carriers, 16 cruisers, six submarines, 11 destroyers, five seaplane tenders, two destroyer tenders, one submarine tender, two mine sweepers and three fleet tugs. The total estimated cost is $945,001,200 and the amount of plain steel required is estimated at 124,460 tons. Substantial tonnages of armor plate and stainless steel would also be needed. Further details of the Navy plans will be found in a separate article in this issue on The Armament Program.

Important as the merchant and naval shipbuilding programs are, however, to general business recovery, it must be borne in mind that much of the work already scheduled will extend over a period of two years or longer; thus the full benefits cannot be included in 1939 business expectations.

OIL *and* GAS o o o

THE petroleum industry has been going through a year of liquidation of excessive stocks of its products. Early in the year there was a surplus of crude oil, and, while this has been reduced to some extent, there is still an excessive supply of gasoline.

Until its own position has been greatly improved, the petroleum industry cannot be counted upon for an increase in orders for steel and equipment. Suppliers do not look for any more business during the first half of 1939 than was received during the last half of 1938. If during the next few months there is an expansion of industrial activity, which would take more fuel oil, and a greater consumption of gasoline, which would tend to reduce present excessive stocks, the oil industry may be a larger buyer of steel and related products in the last half of this year than in the first half.

The supply situation will act as a check on new drilling, except possibly in the Illinois field, where wells are shallow and do not take much steel. Except in California, where there is no effective law to restrict petroleum production, the trend is toward lower output, so there may not be much, if any, need for new storage tanks. A normal volume of work in rehabilitation of refineries is expected, but it appears that these expenditures will be kept at a minimum.

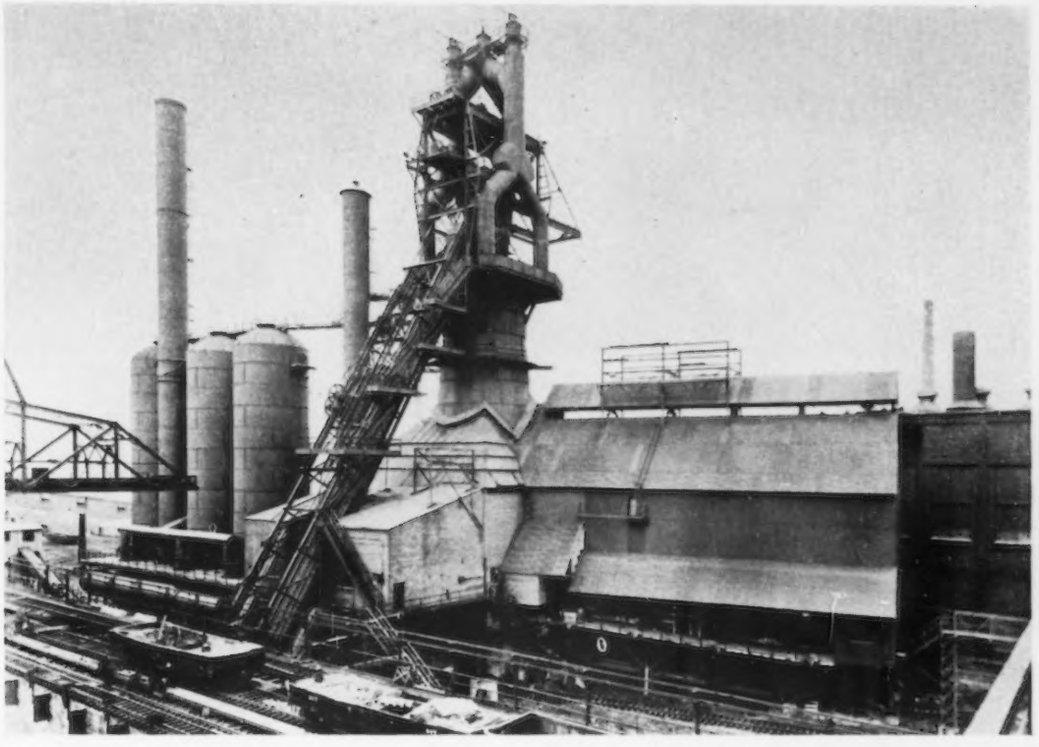
All in all, the oil industry is not one that can be depended upon to furnish much help to the steel industry this year.

In the gas field some pipe line projects have for some time been in the formative stage, but whether such plans will be carried out is by no means certain.

HIGHWAYS o o o

MUCH of the public highway construction is now provided for by Federal aid to the states. This aid, which has been an effective method of improving our highways systems, has been extended through 1940 and 1941 by the Cartwright Bill, passed by Congress last year, which provides for appropriations of $158,500,000 in 1940, of which $100,000,000 is for aid to the states, and $191,000,000 in 1941, of which $115,000,000 is for such aid.

With the cooperation of state highway departments, the Bureau of Public Roads of the United States Department of Agriculture has administered a large volume of highway construction in the past year and is hopeful that similar programs will develop in



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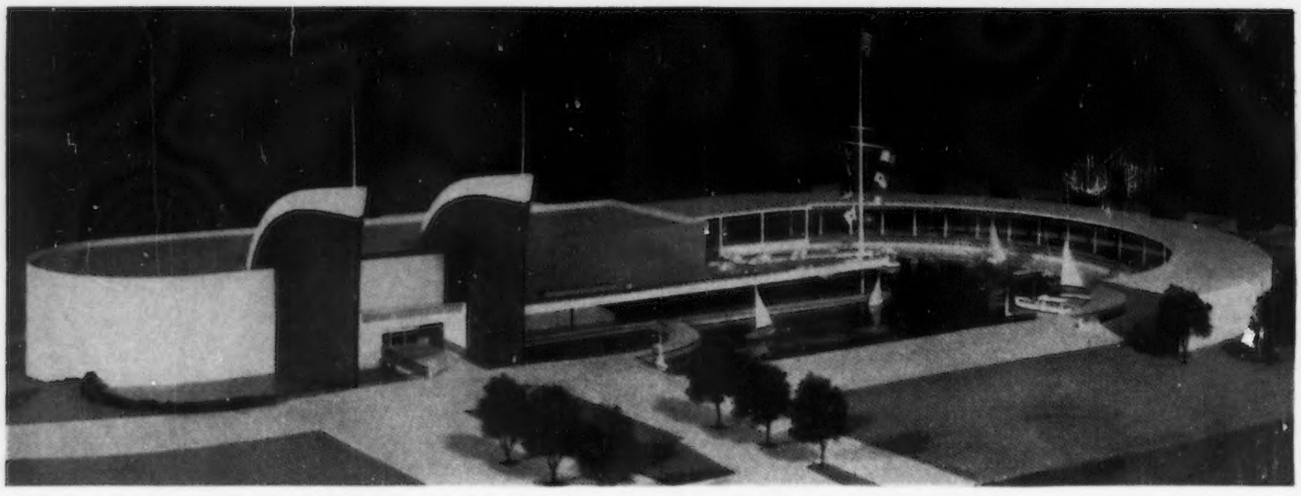


TWIN ship prows, each 80 ft. high (30 feet higher than the nose of the Normandie), give a nautical flavor to the main entrance of the Maritime Building. Sea effect is further enhanced by boat decks, 150-ft. mast and large basin for display of yachts and cruisers. o o o

1939, though no definite predictions can be made as the condition of the Federal grants is that the states shall match the amounts given to them.

In the fiscal year ended June 30, 1938, the Bureau of Public Roads supervised the improvement of 15,345 miles of highways, the elimination of 711 grade crossings, the reconstruction of 144 obsolete grade crossing structures and the protection of 744 highway-railroad crossings by signs and signals.

As an example of the business which road building creates, the Bureau of Public Roads has prepared a table which follows of the approximate amounts that are expended for equipment and supplies for each $100,000,000 expended:

Power shovels, cranes and draglines	$11,485,000
Graders and scrapers	2,720,000
Drilling equipment	1,483,000
Concrete-paving equipment	3,554,000
Bituminous-paving equipment	1,545,000
Tractors	5,061,000
Trucks	16,574,000
Other hauling equipment	2,341,000
Culvert and bridge equipment	1,506,000
Pumping equipment	865,000
Crushing, screening, and conveyor equipment	698,000
Total	$47,832,000
Iron and steel	$4,811,700 (at source)

The construction of toll highways, expenditures for which are not included in the Government aid program except as such may obtain loans from the Reconstruction Finance Corp., promises considerable additional work in 1939. The most ambitious project of this kind is the 162-mile high-speed highway to be constructed from Harrisburg to Pittsburgh at a cost of $58,000,000. A super-highway from Jersey City to Washington on which tolls would be collected is under consideration; its cost would be about $150,000,000.

METAL CONTAINERS o o o

OVER the past few years the consumption of steel for the manufacture of containers has taken roughly about 10 per cent of the United States steel production. The biggest item, of course, is tin plate.

In 1938 the production of tin plate was the poorest since 1932. Complete figures for the year are not yet available, but taking the output for nine months (1,070,642 gross tons) and adding an estimate for the fourth quarter, it is indicated that the 1938 total was not much, if any, above 1,500,000 tons.

The all-time record production was 2,687,128 gross tons (roughly 60,000,000 base boxes) in 1937, and that fact tells a tale which had great bearing on the poor showing of 1938. Owing to the speculative buying that occurred in 1937, caused first by strike fears and then by an advance of 50c. a base box in the price, production far outran consumption, probably by as much as 10,000,000 base boxes, according to reliable estimates, notwithstanding the fact that 1937 was a record year in the packing of vegetable crops.

This excess production was "borrowed" from 1938. It was carried over as inventory at the beginning of last year and became a part of the 1938 consumption. Thus, while production was approximately 10,000,000 base boxes ahead of consumption in 1937, consumption was about the same amount over production in the past year.

Had there been no inventories at the beginning of 1938, production for the year would have been nearer 2,000,000 tons than 1,500,000 tons.

As 1939 opens tin plate inventories in the hands of consumers and at the mills are either normal or below normal. Thus 1939 will be a more accurate reflection of actual packing requirements than was 1938. Can companies estimate that 1939 will be a normal year in both consumption and production of tin plate, which means that at least 2,000,000 tons, possibly more, will be produced. The 1936 production, not affected by speculative influences, was 2,355,561 gross tons. (These figures include long terne sheets as compiled by the American Iron and Steel Institute; this item was less than 5 per cent of the 1937 total).

Whether 1939 tin plate production will equal that of 1936 depends somewhat on general crop conditions and

the carryover of packed food products. A report of the Bureau of Agricultural Economics of the United States Department of Agriculture on "The Canning Crop Outlook for 1939" said:

"The combined tonnage of all vegetables for processing in 1938 is indicated to be 10 to 15 per cent smaller than the large 1937 production and probably will result in a total pack of important canned vegetables about 10 per cent less than the record 1937 pack. Liberal carryovers from the 1937-38 season are indicated for many of these products, however, and probably will provide a total supply only slightly below the record large supply available in 1937-38 and considerably above annual disappearance."

The National Canners Association estimates the total production of all canned vegetables and fruits in 1937 at 250,000,000 cases against 206,000,000 in 1936 and 220,000,000 in 1935, while prior to 1935 the annual production averaged less than 175,000,000 cases. Complete data are not available for 1938, but it is estimated that the total production last year was well above 200,000,000 cases, which is more than the average consumption level. An unfavorable factor to be considered in relation to probable 1939 requirements is the low price level of canned goods, many items being at lower levels than during the low point of the depression.

While tin plate production can reasonably be expected to be at least a half million tons larger this year than in 1938, the outlook for containers made from uncoated steel products is less certain. The demand for both light and heavy steel containers of all descriptions is highly dependent on general business conditions in the various lines of industry in which they are used. Large quantities of steel containers are used for oil, alcohol, chemicals, paints, rosin, turpentine, asphalt, etc., and the outlook for the manufacturers of such containers (and for their steel suppliers) can only be predicted on the basis of the chances for business recovery in all of these varied consuming channels. If there is widespread improvement in business during 1939, the steel container demand will undoubtedly move along with it.

AGRICULTURE . . .

THE farm equipment industry is moderately hopeful for 1939. In a recent address Charles Deere Wiman, president of Deere & Co., Moline, Ill., predicted a rather slow first half with a slight improvement in the second half of the year. Some estimates are that sales of farm machinery and allied products will be not more than 20 per cent below those of 1937, which was a record year.

Farm income for 1938 is estimated at well over 7½ billion dollars, only 13 per cent below that of 1937. Buying power of this 1938 income will probably amount to about 6 billion as against 6½ billion in 1937.

One of the factors that tends to work against much of an improvement in 1939 is the low level of farm crop prices. In view of large grain surpluses, poor export markets and Government interference and indecision, the immediate outlook for much higher prices is not good. Low prices are important psychologically as well as economically because much of the farmer's purchasing is based on current crop prices rather than money in the bank.

Some Favorable Factors

Favorable factors are the continued existence of a large backlog of unfilled needs for agricultural machinery, increased interest on the part of the farmer in lower production costs, considerably improved industrial conditions, plentiful supplies of credit, and greater income from Federal payments, non-farm sources and farm operations. The higher demand for all farm products which is expected to result from better industrial conditions should boost prices to some extent, but this trend may be offset slightly by more production.

Market for Small Farm Machinery

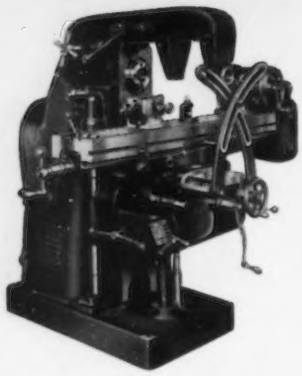
Interest in the small combine, small tractor and other machines and appliances especially developed for farms under 100 acres is expected to show additional progress during the year. Corn pickers, a new green crop loader, and several new attachments for tractors and other machines will be good sellers this year.

One company has on the market a small tractor designed to replace horses, both from the angle of first cost and operating cost. It is intended for farmers who use five or less horses, but is also aimed at truck gardeners and other small acreage farmers with large amounts of field work. Other models are available for farms requiring six to eight and eight to twelve horses.

Another manufacturer is marketing a 6-ft., one-man power-drive combination harvester-thresher designed especially for use on farms with 25 to 50 acres in grain, soy beans or other crops.

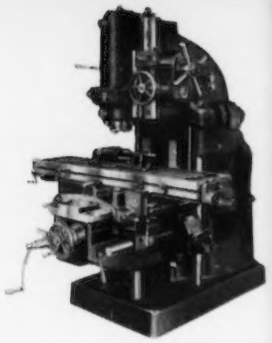
These two companies are perhaps typical of the entire industry in that

THE prows of the Maritime Building form an arresting sight on the New York World's Fair skyline. o o o



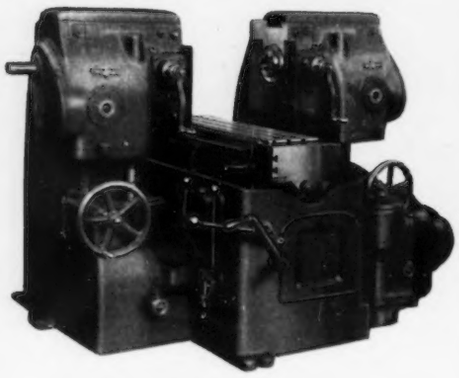
CINCINNATI No. 2 MH
Universal Milling Machine

CINCINNATI No. 3 Plain
High-Speed Dial Type
Milling Machine

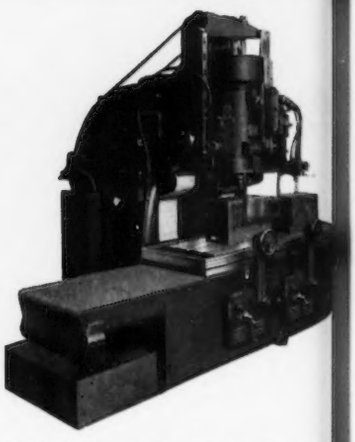


CINCINNATI No. 2 Vertica
High-Speed Dial Type
Milling Machine

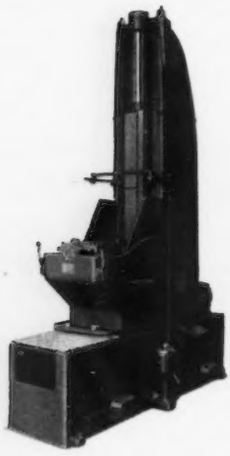
CINCINNATI 2-18 Plain
Automatic Milling Machine



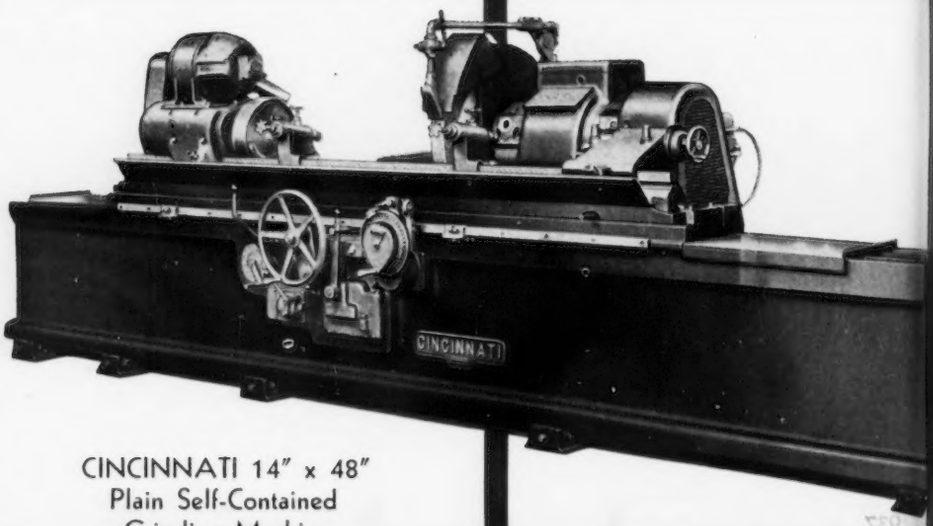
CINCINNATI 3-36 Duplex
Hydromatic Milling
Machine



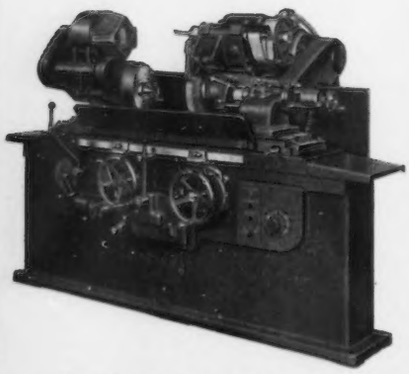
CINCINNATI 48" Hydro Te
Vertical Milling Machine



CINCINNATI 5-54 Single Ram
Vertical Broach



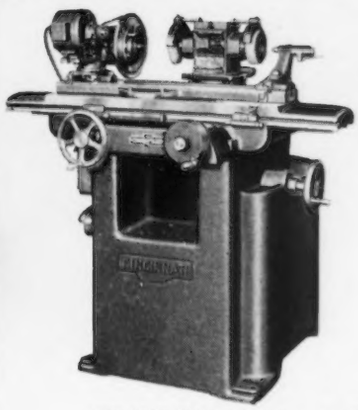
CINCINNATI 14" x 48"
Plain Self-Contained
Grinding Machine



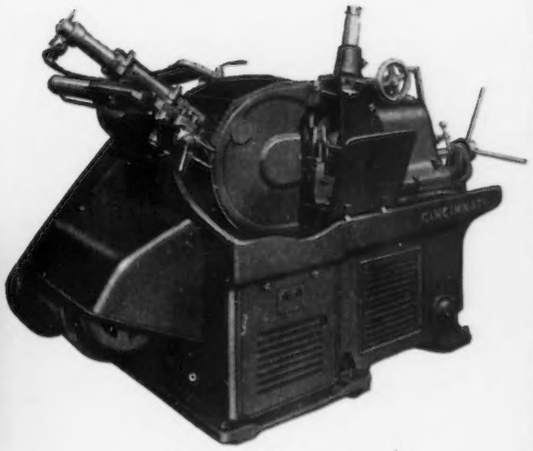
CINCINNATI 12" x 48"
Universal Grinding Machine

CINCINNATI 36" x 168'
Grinding Machine

CINCINNATI 1-12
Plain Automatic Milling
Machine

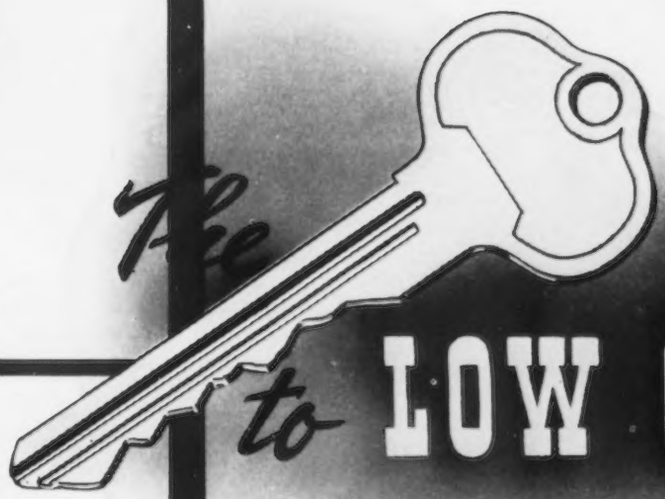


CINCINNATI No. 2 Cutter
and Tool Sharpening
Machine



CINCINNATI No. 2
Centerless Grinding Machine

CINCINNATI 6" x 30"
Plain Hydraulic Grinding
Machine



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the machinery mentioned is not altogether new but represents the work of several years.

AIRCRAFT

AIRCRAFT production for domestic civil use dropped 28 per cent while the export column gained 36 per cent and the military output gained 95 per cent during the first nine months of 1938, the last period for which figures have been released by the Civil Aeronautics Authority.

Without doubt, the new year's developments in aviation are foreshadowed by this record and by current interest in plans for increased armament. Prospects of a huge military procurement program have inspired hopes that have pushed aviation stocks skyward. And while there may be debate on the armament program, there seems to be a minimum of opposition to stiff increases in the air force, which is regarded as being purely defensive in nature. If present proposals are carried out, therefore, aviation will experience a boom unparalleled at least since World War days.

However, it is recognized that some months must pass before any Federal programs of this sort become effective. For the present, orders on hand are sufficient to keep the industry operating actively for much of the next year.

Total output for 1938 should compare favorably with that of 1937, since the end of the third quarter found a total of 2873 new airplanes listed, a 4 per cent increase over the same period of 1937. So-called flivver planes led the field with a total of 996 registered.

The whole aviation industry has operated since August under new Federal control—a five-man board called the U. S. Civil Aeronautics Authority, headed by an administrator independent of the board. This agency, authorized by Congress last spring, exercises the regulatory authority formerly administered by the Postoffice and Commerce Departments and by the Interstate Commerce Commission. In so doing, it supervises mail and passenger schedules and rates, as well as regulating safety features of air transportation. It is the first major Government unit in which administrative and regulatory duties are separate. Transportation companies and pilots generally welcomed the setup as a stabilizing influence.

Air travel, miles and passengers, continued to show increases, the January-June increase in mileage amounting to 2,213,634, while 113,511 more passengers were carried. The total amount of express carried, however, showed a loss of 318,045 lb. During this period the lines carried 666,825 passengers, 3,943,353 lb. of express and flew 38,734,654 miles. Passenger-miles also gained, an increase of 47,876,120, bringing the total for the half year to 289,554,564 miles.

MACHINERY . . .

ALL signs point to an improvement in buying of machine tools on the part of general industry in 1939. Last year many concerns of national prominence restricted their purchases of productive machinery to practically nothing. Some announced big programs and then did not put them into effect until the latter part of the year. Based on earlier estimates coming from the automotive industry, for example, the 1938 equipment program of that industry was disappointingly small. In fact, it would have been a poor year indeed for the machine tool industry had it not been for foreign business coming chiefly from England, Russia and Japan.

This year prospects look decidedly better for the domestic volume. Not much of a dent has been made in the Navy's $8,200,000 appropriation for machine tools at the various Navy Yards, made at the last session of Congress. The arsenals will again enter the market as they did last winter and spring, and there is every indication that aircraft engine and plane builders will continue to expand their productive capacity as they did in 1938. There is talk of many mechanical changes in 1940 automobiles. Last year many important changes were suspended because of the cost of retooling at a time when sales were low, but with the industry in a much more optimistic frame of mind this January, there is every reason to believe contemplated 1940 design changes will be carried through, necessitating substantial equipment buying.

In the farm equipment industry, International Harvester has already taken the lead, with an announcement in early December of a huge program of equipment rehabilitation in all its plants, to be carried out in the form of equipment purchases this year. Railroads began buying freight cars late in 1938 and with a betterment in traffic some of the better managed roads may resume their shop equipment replacement programs, dropped last year.

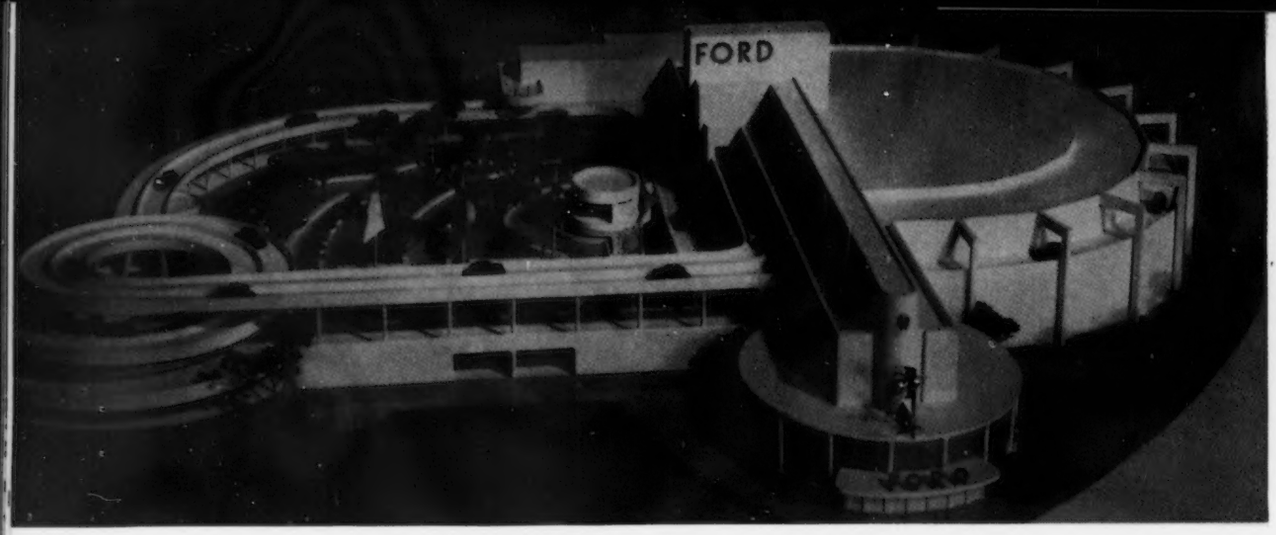
Buying of machinery on the part of general industry will depend upon a

o o o

PAINTER brightens up the statue by Joseph E. Renier in the Court of Communications at the New York World's Fair. In keeping with its title of "Speed" the sculpture emphasizes the horizontal line in its design.

o o o

TO STEEL
Canton, Ohio



THE theme of the Ford Motor Co.'s exhibit will be prophetic of the advances that the United States may expect in transportation in future decades. The exhibit will be climaxed by "The Road of Tomorrow", an elevated highway more than half a mile long which will encircle the building. The structure itself is 510 ft. long, 420 ft. wide and 88 ft. high at its peak. The architect was Albert Kahn, Inc., Detroit.

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number of factors, all of which are much more favorable than a year ago. Factory employment is on the increase, and most business indices have been on an upward trend since July. Sentiment has definitely improved since Election Day, but no spurt in orders followed an increase in confidence. Quotations have been made, however, on large numbers of machine tools and the release of orders from widely scattered sources may be awaiting only the preparation of 1939 budgets.

MISCELLANEOUS . . .

IN recent years the amount of steel business emanating from sources which the steel companies classify as "miscellaneous" has been an increasing percentage of the entire production.

The aggregate of all miscellaneous business in 1937, according to figures compiled by THE IRON AGE, was about 32 per cent of the entire finished steel production. Many of the consumers who are placed in the miscellaneous classification are small users individually, but there is a growing number of them and they undoubtedly represent hundreds of different types of manufacturing.

As a group these steel users are influenced by many and varied factors, depending upon what class of trade they cater to in the selling of their own products. It is obvious that their purchases of steel will respond to any general improvement in business as a whole. Many of them no doubt make items which are largely sold in retail trade and they would therefore benefit from an expansion of consumers' purchases.

THE Consumer Interests Building will be situated in the heart of the Fair's main exhibit area and will be devoted to exhibits showing the consumer how to get the most for each dollar spent for merchandise.

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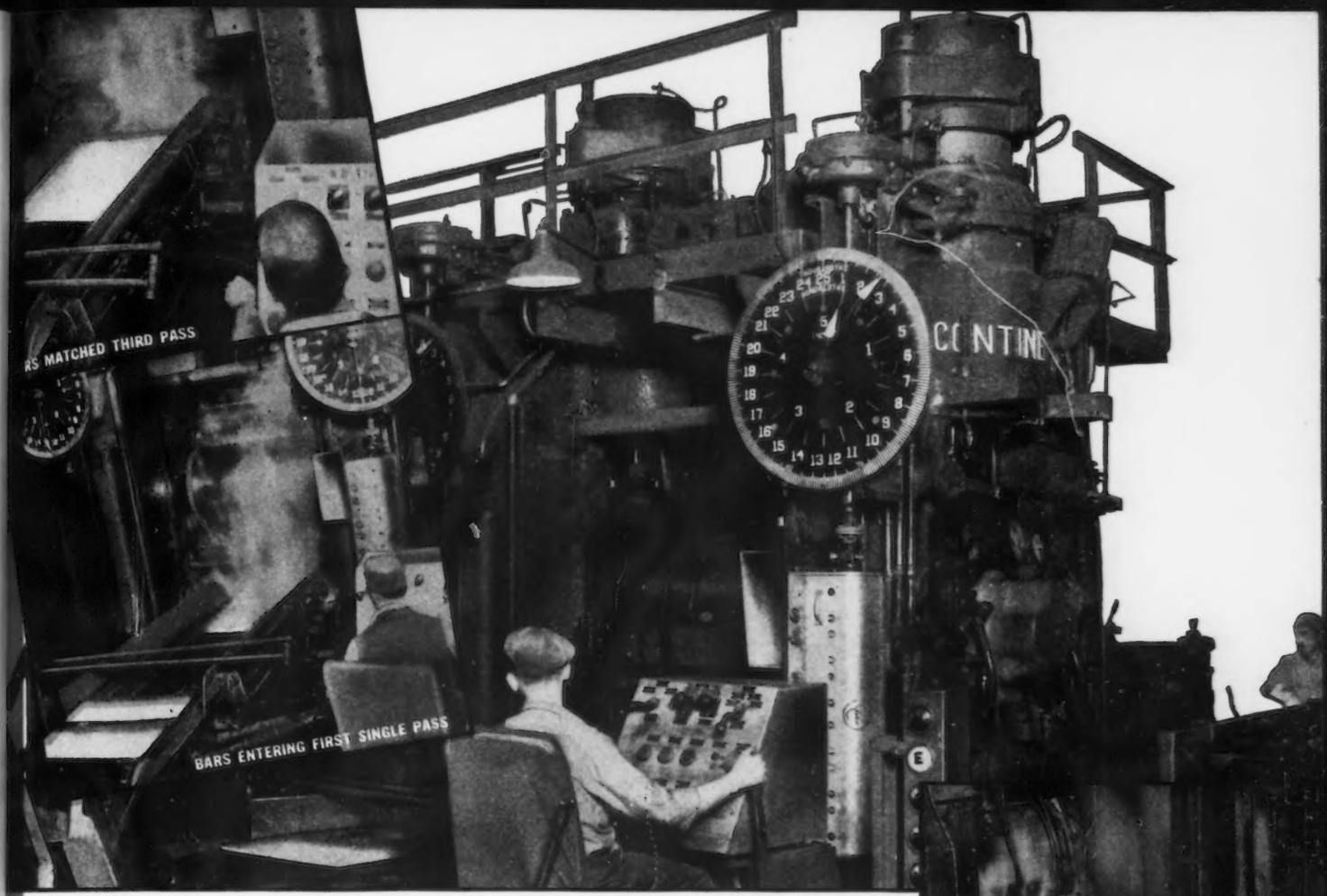

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Operators of automatic feeder and catcher tabl conveniently seated in full view of work, with electr control box in front of them. Hand levers actuate si guards and stops; foot pedals and palm-operate push buttons control delivery of pairs from furnac and operation of tables and screwdown. Signal ligh afford automatic check of every operation.

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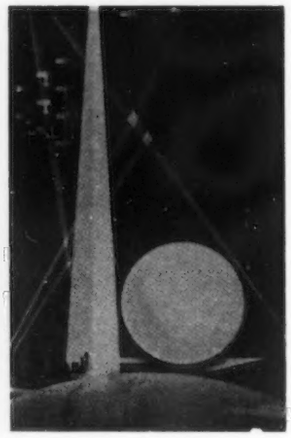
THE *Armament Program* AND THE CAPITAL GOODS *Industries*



By JAMES G. ELLIS
Associate Washington Editor, THE IRON AGE

WORLD events have prompted the Administration to launch an armament program unprecedented in the nation's peace-time history. The War Department with industry is developing plans for further mechanizing the Army, for manufacturing aircraft on a production basis. Top-ranking naval men are talking in terms of two fleets and strengthening shore bases. To the heavy industries, the program may mean a trade stimulant in excess of $2,000,000,000 during the next 18 months.

The defense program can be divided into two categories. That part which is the result of Congressional action last session; and that phase which is still highly nebulous and which cannot take definite form until the 76th Congress weighs the need for increased armament outlays. Grumblings already have been heard and the sailing ahead is far from smooth. Some Congressional members are inherently suspicious of New Deal motives; others regard the program as an insurmountable threat to a balanced budget; still others are from sections of the country definitely not "defense-conscious." To the query "what about national defense?" members of the latter group invariably reply: "Defense from what?"

Nevertheless the defense question is apparently destined to occupy a major part of the new Congress. If successful, the program may mark a basic change in the Administration's recovery program — a transfer of emphasis from consumer goods to durable goods industries—and give armament activities a wholly unaccustomed place in the business picture.

Naval Expansion

To grasp the extent of the broadened armament plans, the pace set by Congress last session provides something of a yardstick. It passed a Navy budget of around $550,000,000 and a War Department budget of close to $500,000,000—the largest in 18 years —and set the wheels in motion for expenditures for the year ending June 30, 1939, of more than $950,000,000 through durable goods channels. Directly or indirectly the Congress made possible these expenditures:

(1) $150,000,000 for the construction of 50 ships under Maritime Commission's plans. This pace will also continue for a 10-year period;

(2) $154,000,000 to begin construction of 37 vessels under the 20 per cent naval expansion program. Expenditures are expected to average $200,000,000 a year for the balance of the 10-year undertaking;

(3) $20,700,000 for naval armor, armament and ammunition;

(4) $8,200,000 for machine tools and other shop equipment to overcome existing deficiencies at the Government's 10 industrial Navy yards. Assuming that private yards, which are sharing in the naval building program, approximately on a 50-50 basis, will find it necessary to rehabilitate their equipment to the same degree, an additional $8,200,000 expenditure will result;

(5) $38,616,500 for shop and yard facility improvements at Navy yards;

(6) $27,186,000 for new naval aircraft, plus an additional $15,000,000 to make plane contracts;

(7) $33,150,646 for approximately 600 new Army combat planes, engines and spare parts; and $16,126,895 for other planes and aeronautical equipment; $1,000,000 for Army motor vehicles of various types;

Ordnance Expenditures

(8) $24,631,444 for Army ordnance purchases broken down as follows: $8,126,480 for 3 in. anti-aircraft materials; $6,025,000 for machine tools and other special machinery; $500,000 for inspection gages; $5,095,886 for ammunition items; $1,759,397 for artillery purchases; $3,124,680 for small arms items; and $2,000,000 for educational orders to familiarize industrial firms with the Government's war-time re-

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Chromium Metal
Chromium-Copper
Miscellaneous Chromium Alloys

CALCIUM
Calcium-Silicon
Calcium-Aluminum-Silicon
Calcium-Manganese-Silicon

ZIRCONIUM
Zirconium 12 to 15%
Zirconium 35 to 40%
Aluminum-Zirconium

SILICO-MANGANESE
All grades including Silico-Spiegel

MANGANESE
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Low-Carbon Ferro-manganese
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Manganese Metal
Manganese-Copper
Miscellaneous Manganese Alloys

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Miscellaneous Silicon Alloys

VANADIUM
All grades

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quirements, thereby reducing substantially the time required to shift from a peace to war basis; and

Electric Power Expansion

(9) $1,000,000,000 a year for the next two years for the manufacture and installation of generating equipment of 1,300,000,000 hp. capacity in a move to aid manufacturers in war material centers to remove electric power bottlenecks, assuring them of adequate supplies of power in emergencies. Definite commitments already have been made by leading utility companies.

That part of the program is assured. Since its approval, however, notably a few weeks after the Munich agreement, President Roosevelt announced that the national defense problem was delaying a consideration of the 1940 budget; Assistant Secretary of War Louis Johnson, on whose shoulders rests the responsibility of mapping war preparations, began forecasting huge increases in the air force; and Navy Department corridors buzzed with renewed talk of two fleets. Harry Hopkins, WPA administrator, New Deal Advisers Corcoran and Cohen, and representatives of the Army's Planning Branch and the Navy's Munitions Board went into huddles with the President and reports became current that the Administration was preparing to shift the WPA relief burden to a national defense basis.

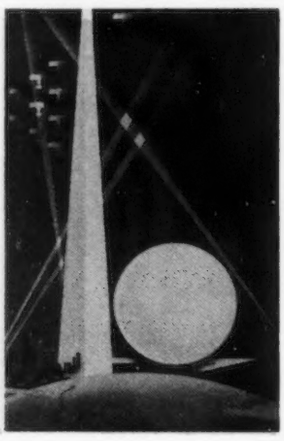
As the weeks went by, the Administration remained scrupulously uncommunicative on some phases of the program, surprisingly frank concerning others. The press was told at Hyde Park that the Government would reopen the New Orleans Navy yard and that the $22,000,000 armor plate plant at Charleston, W. Va., which has lain idle for 16 years, would be put in operation for an undisclosed purpose. By the time the United Kingdom and Canadian trade agreements were ready for signature, and plans for the Pan-American conference were made known, defense discussions, sprinkled with such terms as "continental solidarity," were broadened to include hemisphere defense plans.

As a result of these developments, the new Congress will wrangle over such proposals as these:

New Proposals

Army—an appropriation of $30,000,000 for educational orders, an increase of $28,000,000 over the $2,000,000 authorized last session; $143,000,000 for semi-automatic rifles, tanks, anti-aircraft and anti-tank guns and other weapons;

Navy—two additional battleships, possibly of 45,000 tons each as contrasted with the six under construction of 35,000 tons, and a score of other warships; modernization of five existing battleships and two aircraft carriers and a further extensive strengthening of shore bases. (This proposal would be in addition to an anticipated Congressional appropriation of close to $200,000,000 to begin construction of 40 ships under the authorized 20 per cent increase in naval strength.) For additional machine tools and



equipment for the Navy yards, $11,000,000;

Air force—upward of 9280 planes for the Army Air Corps, four times the present goal of 2320 first-line military planes fixed for 1940. An expansion of the Navy's present program by 1000 planes above the 3000 already authorized;

Storing—a six months' supply of so-called strategic and critical materials which the country normally must import. The proposal already is embodied in the Thomas bill, which has the support of both War and Navy Departments;

Financial—a 1939-1940 War Department budget of around $600,000,000, an increase of $100,000,000 over current appropriations. A Navy budget of around $700,000,000, an increase of $150,000,000.

An Atlantic fleet would cost $2,800,000,000, of which about $1,260,000,000 would go for machinery. The vessels, requiring about 258,000 tons of plain steel, would include 12 battleships, six aircraft carriers, 35 cruisers, 77 destroyers and 36 submarines. In addition there would be 56 auxiliary vessels, taking some 82,000 tons of steel and requiring an additional $400,000,000, bringing the total cost of such a fleet to $3,200,000,000.

Current Naval Shipbuilding Program

Briefly, the current naval shipbuilding program shapes up like this: Assuming that production schedules will be adhered to, 15 ships will be launched this year; 21 in 1940; and 17 in 1941. Total cost of the ships under construction, but not yet launched, is estimated at $804,601,800 of which approximately $345,800,000 will go for machinery. About 153,000 tons of plain steel will have been used when the ships are completed. This includes the four battleships contracted for within the last month. They will cost a total of $283,401,200 and will require 56,000 tons of armor plate and 44,000 tons of plain steel.

Mobilizing Metal Working Plants

Under lock and key, the War Department has carefully drawn plans for mobilizing metal working plants in a minimum of time, some 10,000 having been earmarked for war production. The Department knows where every ton of its war-time steel is coming from. The steel industry is vastly better prepared to cope with war-time production than it was in 1917. Soaking pits, for example, regarded as a serious bottleneck as recently as 1937, have been modernized, new ones constructed, and large companies are prepared to handle emergency demands. New and modernized blooming mills also hold out promises of much better production rates than was possible a few years ago, with the possibility of exceeding nominal capacities.

Duplex steel, which was viewed with some suspicion during the last war, can be made today of a quality comparable with any other steel. At least three companies are considering the installation of duplex facilities—a move which would permit them under certain circumstances to almost double present capacity. Because of seamless tubing and electric weld advances since 1917, pipe mills conceivably could take care of domestic and war-time demand simultaneously. Many mills which have lain idle for some time could be reconditioned and pressed into service if the need arose.

It has been estimated that it would

(CONTINUED ON PAGE 171)

OF INDUSTRY

Shouldering the heavy metal working jobs of industry is the responsibility of these Buffalo machines just as it is the task of sturdy draft horses to do the heavy work on the farm.

Punching, shearing, bending, drilling—for each of these operations there is a Buffalo machine with "work horse" stamina. Substantial, practical design followed up by capable construction, plenty of weight in the right places —a full understanding of the customers' requirements— these are the reasons for the success of Buffalo punches, shears, bar cutters, bending rolls, and drilling machines.

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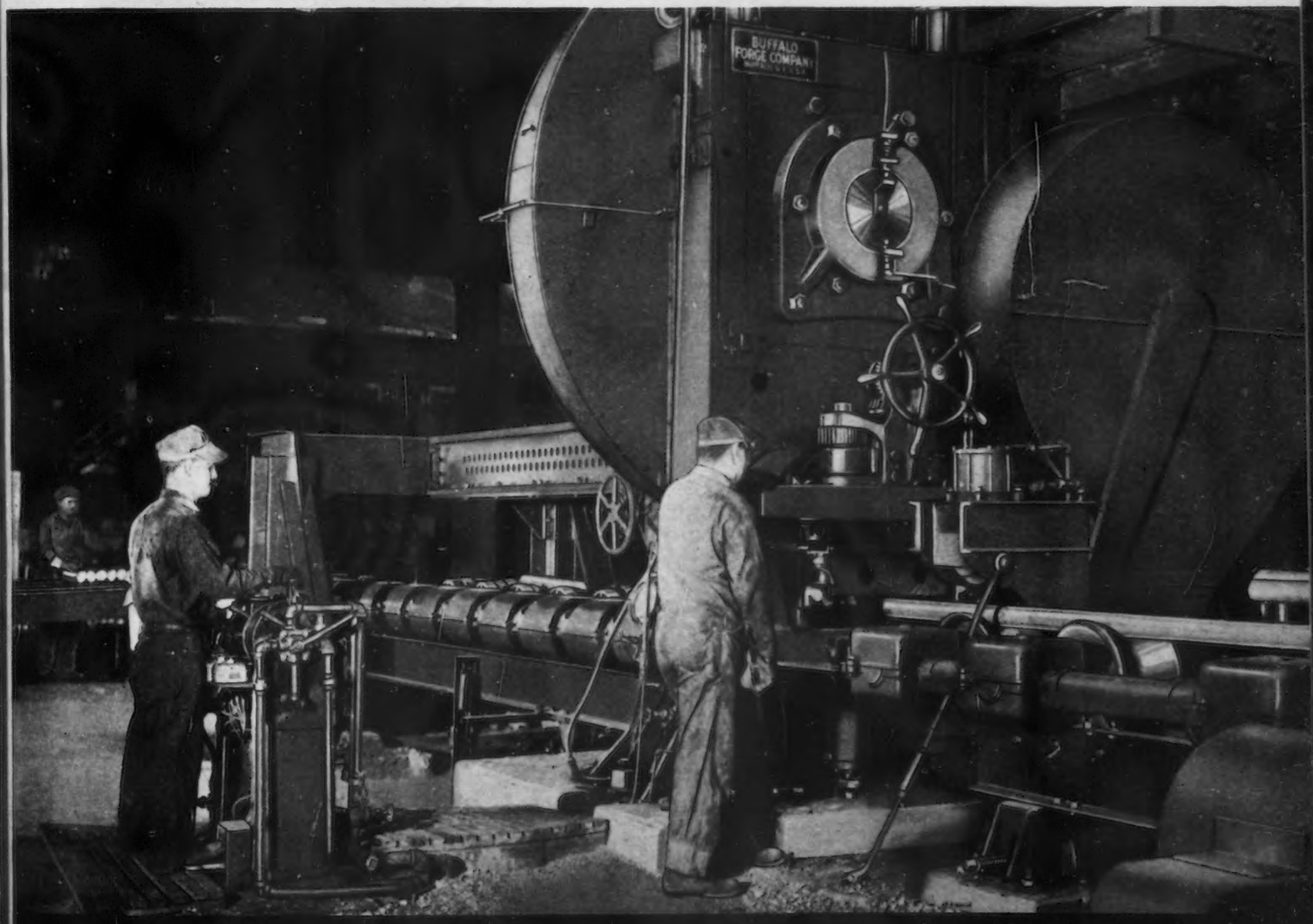


● Buffalo Punch and Shear similar to many we have built for leading industrial plants here and abroad.

BENDING ROLLS AND DRILLS

THE LEGISLATIVE "Carryover"

o o o

By L. W. MOFFETT

Washington Editor, THE IRON AGE

o o o

ALMOST $23,000,000,000 spent; The national debt increased to $40,000,000,000 or more;

The continuously unbalanced budget rising, with an indicated $4,000,000,000 deficit for the 1939 fiscal year;

Taxes mounting inordinately;

11,000,000 unemployed;

Civil payroll $1,500,000,000 annually;

Annual Government expenditures averaging $6,500,000,000, with outlay of $1.66 for every dollar of revenue;

Expansive and expensive farm program ($700,000,000 annually) in a state of virtual collapse;

Some $50,000,000,000 credits frozen in banks because there is no field for profitable investment.

This is a factual picture of nearly six years of the New Deal.

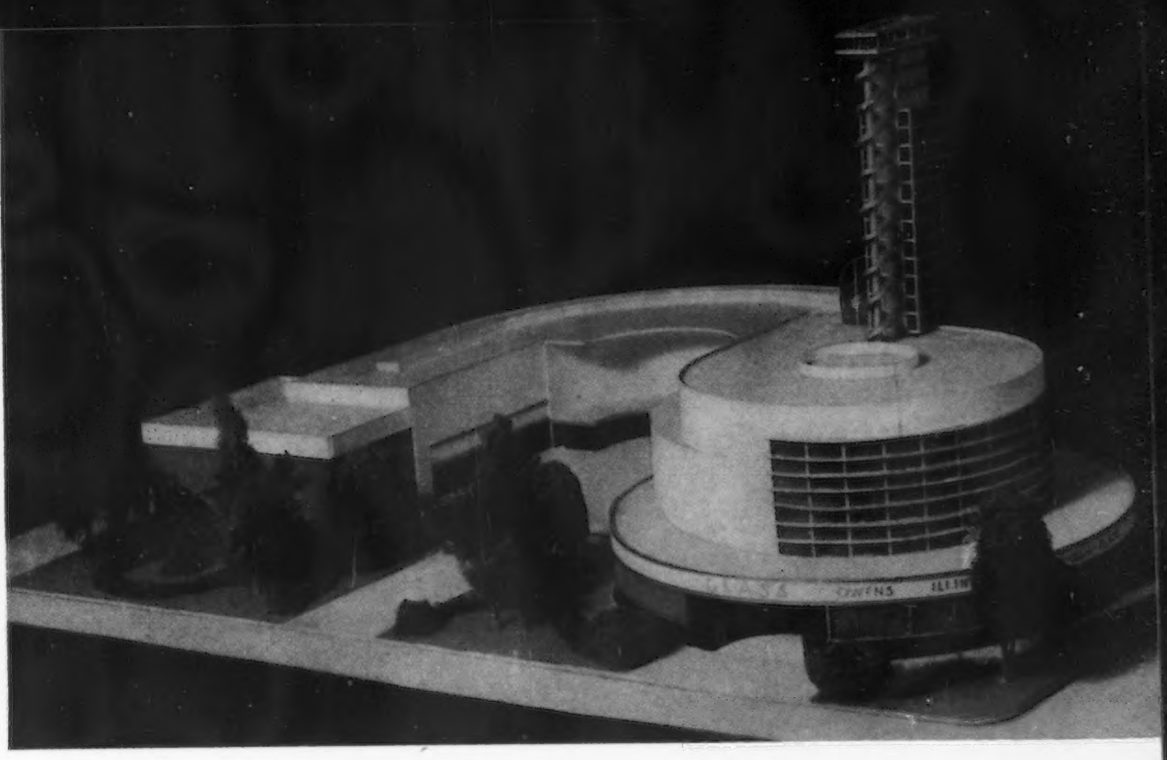
Distinctly this is not recovery so assuredly promised when the reins of the Government were taken from the Hoover Administration, which was so bitterly derided for throwing the country into a sharp depression and for its expenditures, which by comparison with the squandermania of the New Deal, were small change.

Finally, after five years, the country's answer came in the elections of last November. The electorate turned in no uncertain terms on the New Deal, convinced that only artificial improvement had come about. A false Santa Claus was unmasked and branded as a tax-eating, deficit-financing fraud. His vicarious and prodigious shot-in-the-arm largesse had failed to bring business permanently out of its habitual slump. Fortunately there is now a cautious upswing under way with partial resumption of long-delayed buying. But there still prevails fear of further Government extravagance and even more rigid and confusing regimentation, which already has penetrated into an extremely wide range of business activities. The election inspired hope, but not assurance, that there will be a sufficiently formidable opposition to the New Deal to reverse the trend by cutting Government waste and removing harmful control over business. It remains to be seen whether this will be done. Certainly the New Deal, if it thinks it can jam them through Congress, will proceed with sweeping control measures involving further financial outlays under the guise of reform. With the new Congress meeting on Tuesday of the present week, the test is at hand.

People Tiring of Extravagance

Wild spending, according to a Gallup survey, was assigned as the chief reason for the New Deal defeat last November. While the majority of those dependent on Federal spending supported the New Deal in this sampling of voter reaction, there was a large movement even in this group from the Administration. It remains to be seen, however, whether actually in Congress the various special interest groups, without regard to political affiliation, respond to the demand for a let-up on patronage spending. There are predictions that even greater drains may be made on the Federal Treasury. Traditionally Congress, without respect to party, is pork-minded. New Deal Congresses have been particularly so. Election of a considerable number of so-called Republicans has been attributed to promises of still more liberal Government outlays, particularly regarding old age pensions and other Social Security expansion plans. But this is not just a political attitude. Even important business groups, realizing the inadequacy of payments contemplated under the present law, favor more liberal allowances and generally taxation is urged to prevent deficits.

Nevertheless, this issue aside, election results were construed as a rising revolt against bureaucracy, regimentation, political misuse of relief funds, one-man Government, the purge phobia, the wave of reckless "reforms" and hostility toward business which



THE Glass Center will have a floor area of 25,000 sq. ft. and contain the exhibits of three leading glass companies, Corning Glass Works, Owens-Illinois Glass Co., and Pittsburgh Plate Glass Co. The tower, 108 ft. high, is of blue plate glass and glass block.

has given the country a bad case of jitters. This expression of the voting public was reassuring to industry.

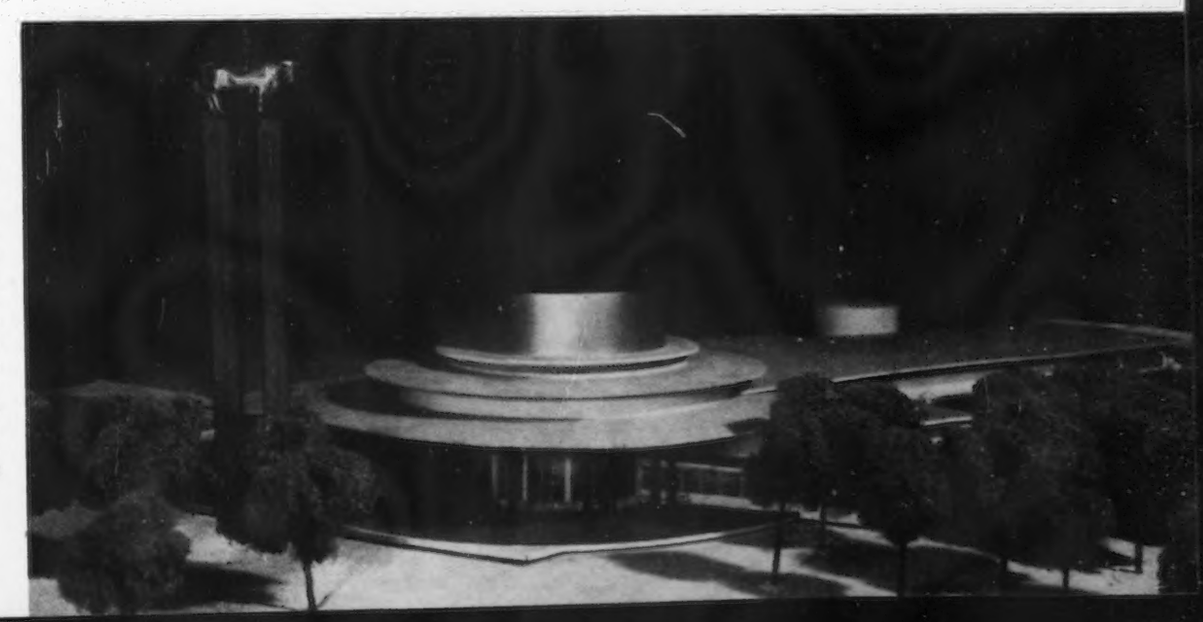
Conservative Trend Worries the Radicals

It is not simply the so-called Republican gain of 81 in the House and seven in the Senate which worries the New Deal. The greatest worry is over the more sensibly conservative trend of the country. Numerically the Republicans are much in the minority with only 170 out of 435 in the House and 23 out of 96 in the Senate. But combined with conservative Democrats, for whom New Dealers have a greater aversion than even for Republicans, they can block the Administration. And that is what they are expected to do on many important issues. In the absence of organized public revolt, the question of spending may be an exception. There is danger that the change demanded will not be in the degree, but only in the kind, with an effort to give Congress rather than the Executive branch control of expenditures. But much more than in previous Congresses of the New Deal Administration, it is confidently predicted that party lines will unite to head off, if they are offered, extreme Administration measures, bearing the stamp of Corcoran, Cohen, Hopkins, & Co., and projected in the name of "reform."

The Administration is represented as being as determined as ever to push "liberal reforms." Yet, whatever its front for pushing forward with a broad "social and economic" program, the New Deal has given evidence of seeing, though not acknowledging, a mandate to stop harassing business and slow up on quack legislative panaceas that have left the business patient in a much worse condition than before the prescription was written. The New Deal seems less sure of itself and its ability to "make America over." Perhaps it has its tongue in its cheek, but even the queer brain trust, whatever it may be doing subrosa, is in a more quiescent state outwardly.

Rubber Stamp Idea Losing Ground

Probably under cover it is still engaged in its customary orgy of legislative framing beyond initial recommendations to cure all sorts of economic and social ills, but it is supected it realizes that it can no longer rubber stamp it through the new Congress. There are those who think that the New Deal, however, might adopt a strategy of this sort to measure its strength with, and as a defiance to, a stiffened opposition. Such an attitude might also be assumed as a play to



AN ultra-modern dairy is to be presented in this exhibit building by the Borden Co. In the circular part of the structure, a rotolactor is to revolve and upon it 200 cows are to be washed and milked mechanically every 24 hr. The building, with its animals and equipment, will cost $500,000, part of which is to be borne by manufacturers of dairy apparatus.

the so-called "liberal forces" with an eye on 1940.

Meeting defeat the New Deal can readily resort to its old technique, badly worn as it is, and loudly proclaim that its "reform" program had been blocked by the reactionary elements. The trick is amateurish. But, placed under closest scrutiny, the fundamental weakness of the New Deal, despite its flaunted political skill, is seen to lie in its crudity. It is insulated from refinement by an egocentric passion to personalize rather than to administer Government under the American system, a system for which the leftist element has no sympathy.

CASTING its shadow of modern design, this is one of two pylons rising above the Chrysler Building at the New York World's Fair. Inside will be a transportation exhibit, designed by Raymond Loewy and reaching a climax in the simulated departure of a rocket ship from an interplanetary port.

Administration May Resist Labor Act Changes

It would seem that the Administration will face a vigorous drive in Congress to bring about a revision of its legislative "reform" program. An outstanding instance is the demand for wide changes in the National Labor Relations Act, but it is clear the Administration will strongly resist other than slight amendment. The spending policy will be bitterly attacked with demand for earmarking "relief and recovery" funds.

Republicans as well as Democrats are asking for extension of the scope of the Social Security Act. There will be an effort to compel a "pay-as-you-go" plan, to replace the present policy of accumulations which go to the general treasury fund and are diverted to miscellaneous uses. It is doubted that the drive will be successful. There will be a healthy row over the enormous "western hemisphere" national defense program, already being assailed as a disguised pump priming project of huge proportions. Both the program itself and proposed taxes to finance it will be sharply attacked.

The carry-over legislative line-up as seen at this time follows:

TEMPORARY NATIONAL ECONOMIC COMMITTEE: The steel industry is scheduled for searching analysis in all its phases, costs, production, prices and distribution (including basing point system) through Department of Justice-Federal Trade Commission and witnesses from the industry expected to be called at a comparatively early date. It is a question whether, because of extreme breadth of study which cannot possibly be completed in two years, Congress will be asked to set up a permanent executive organization, such as Industrial Bureau of Economics, to take over work. Such a bureau was suggested at the opening of hearings by Leon Henderson, executive secretary of the committee. Legislation revising anti-trust laws is contemplated which may greatly tighten Government control over industry. Immediate indications point to recommendations to further limit control of use and price of products through patents; Federal licensing of all interstate commerce corporations; Government certification or labeling of products, designed to enable small business units to compete on stronger basis with larger business concentrations; wage-hour law for agriculture under cost-of-production system to fix floor for farm products; further strengthening of Clayton Anti-Trust Act. Some of these recommendations, if made, probably will be enacted into law as proposed or in revised form, regardless of Administration in power. Others will not. It is doubted that outright recommendation for abolition of basing point system will be made.

SOCIAL SECURITY ACT: The general taxpayer, including industry, will have to pay more for Social Security by 1940; the act will be liberalized in the forthcoming session of Congress. The growing popularity of numerous pension schemes all over the country is only one factor but an important one because many members of the new Congress are pledged to work for enactment of almost utopian programs which would admittedly bankrupt the nation quickly. The President last April in calling on the Social Security Board to formulate plans for "liberalizing the old-age insurance system" sounded a note for major changes in the act. The report and recommendations of the Social Security Advisory Council, a Congressionally-created board of representative citizens, will be before the Congress. As previously reported in THE IRON AGE, the council proposes increases in old age pensions, employers, employees and the Federal Treasury each to contribute one-third of the additional cost, amounting to $115,000,000 annually based on 1937-38 cost. The present law provides for an increase of the present one per cent tax for old age insurance on employer and employee to one and one-half per cent beginning in 1940 and lasting through 1942. It is expected that by 1942, when the old age rate is again boosted to two per cent, major changes will be made both in the tax rate and in the reserve account which, if left to accumulate under present plans, would reach the staggering sum of $47,000,000,000 by 1980.

Not to be overlooked are unemployment compensation, health benefits,

(CONTINUED ON PAGE 172)

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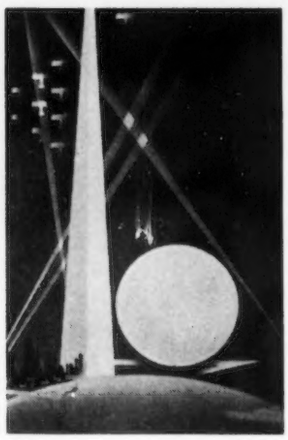
1939 LABOR RELATIONS FORESHADOWED *by* 1938



By JAMES A. ROWAN
News Editor, THE IRON AGE

THE attitude of the American public toward organized labor and its opinion as to the union's rightful place in the economic and political life of the nation show signs of hardening as the new year begins.

Many people, including most employers, probably have made up their minds about John L. Lewis, chief of the Congress of Industrial Organizations, and about William Green, president of the American Federation of Labor. But there are many labor questions still unanswered.

Is Mr. Lewis to continue to be what some consider American industry's No. 1 problem child, remaining a tool in the hands of radicals who keep him befuddled about what is really going on in their minds, or will he move of his own volition toward the middle of the road and become in time a unicersally esteemed champion of collective bargaining?

What will Mr. Lewis and the unions he represents do when and if they must decide, as similar organizations in France recently have had to decide, whether to be patriots or saboteurs in the event this country faces real peril from abroad?

Would the CIO unions, after an indifferent record of contract observance in peacetime, keep their contracts with industry in wartime? Would the CIO and the AFL forget the 40-hr. week in America's hour of need and would Mr. Lewis, in particular, help his radical associates attempt to seize political power in a class conflict of the type to which Mr. Aubrey Williams, assistant WPA administrator, recently gave his indorsement? Will Mr. Lewis try to "turn back the clock" on the machine?

The metal-working industries, business generally, would like to know what is in Mr. Lewis' mind or what is in the minds of some of his associates regarding such questions, many of which boil down to the not easy matter of measuring the CIO's radicalism, of determining just what it is to be, whether a cluster of working men's unions or something else.

Another question still to be answered is whether Mr. Green can lead and direct the surging will among industrial workers everywhere to engage in collective bargaining to a degree unknown in this country in the past.

Judging from last November's election, in which the CIO unions were for the most part millstones around the necks of the candidates they supported, the more middle-of-the-road these unions become the more likely they are to remain a permanent part of the labor scene.

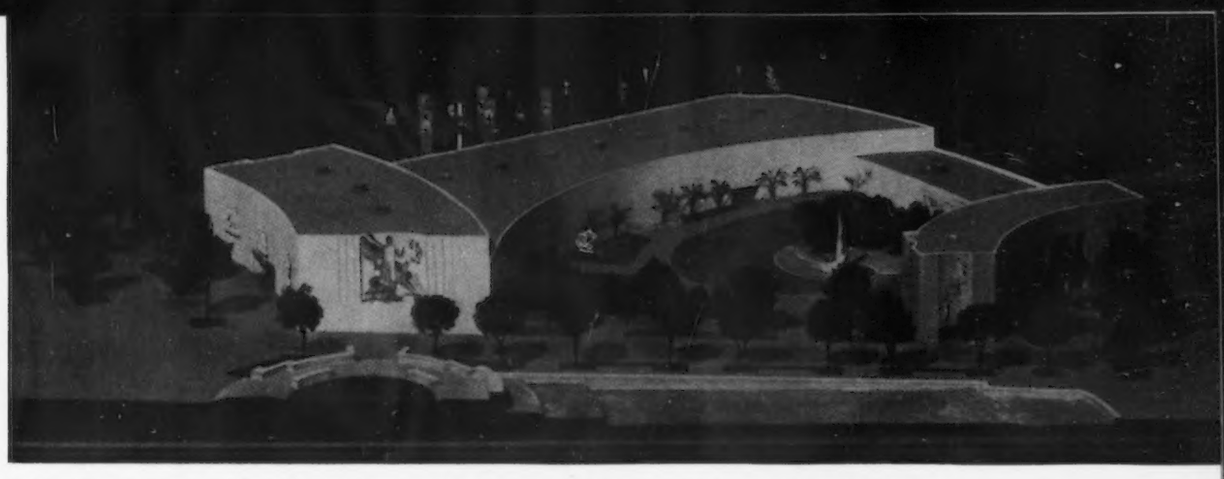
The Pittsburgh CIO Convention

Possibly the recent CIO convention at Pittsburgh gave some indications as to whether the CIO will become more radical and more willing to sponsor work stoppages hampering recovery and bedeviling industry during 1939 or whether the cooler heads in the CIO leadership will prevail.

Friends of the CIO for almost two years now have been assured that the organization will expel the Communists and Communist sympathizers among its leaders and in the rank and file as soon as it grows strong enough to do the job of organizing mass production industries without their help.

Yet Mr. Lewis at the Pittsburgh convention was forced to praise Harry Bridges, West Coast CIO leader under heavy fire as a Communist, and was persuaded to approve a resolution pledging full support to Mr. Bridges in his fight against deportation. Said Mr. Lewis: "I take this opportunity to express my personal confidence and that of the CIO in the leadership of Harry Bridges."

In return for this gesture of faith, which industrialists who must deal with the Steel Workers Organizing Committee and other CIO affiliates will be unlikely to forget, the left wing elements of the CIO, including the American Communications Associa-



THE Medicine and Public Health, Science and Education Building at the New York World's Fair is in reality two buildings. It is to house medical and health exhibits in that portion extending from the main entrance, at the extreme right of the photograph, for two-thirds of the structure toward the left. The remaining floor space in this part of the building and extending at an angle to the left, is to contain exhibits in Science and Education. o o o

tion, the National Maritime Union and the International Longshoremen's and Warehousemen's union, gave up their attempts to have the CIO convention adopt a provision that the organization open its membership to all regardless of political beliefs (in this case, Communism).

Accompanying the indorsement of Bridges was a blanket denunciation of American newspapers who, paradoxically, can take most of the credit for building up Mr. Lewis into a dramatic public figure.

His eyebrows, newspapermen remember, are Mr. Lewis' own but the impressive mantle of the Man of Destiny which the press of the country helped hang over the CIO leader's bulging frame seems, on even casual examination, to be highly synthetic and to be bearing the label "Made in the Editorial Rooms."

That a movement so helpless without publicity would turn on newspaper writers who for several years have charitably printed the CIO's claims about membership and other evidences of material progress, even with tongues in cheeks, had an element of surprise and a suggestion of desperation that did not harmonize with the smiling assurances of Mr. Lewis and Mr. Philip Murray, SWOC leader, that everything is well within the CIO.

"We Love John Lewis"

Observers noted that The Daily Worker, the "central organ, Communist Party, U.S.A., affiliated with the Communist International," reported that the CIO delegates at the convention shouted to Mr. Lewis: "But we love him." Then, said this publication, "the delegates jumped to their feet applauding and shouting 'Lewis! Lewis! Lewis! and CIO! CIO! CIO!' Fists pounded on tables. Bits of newspaper filled the air. Then the delegates went into a snake dance, carrying their union signs and singing 'Solidarity' and 'Lewis is our leader.' Lewis, standing on the platform, was visibly pleased. He tried to look solemn but every few minutes he would break out into a warm smile."

Meanwhile the CIO convention listed four major objectives in a constitution which the union delegates were asked to approve by vote without seeing. They are:

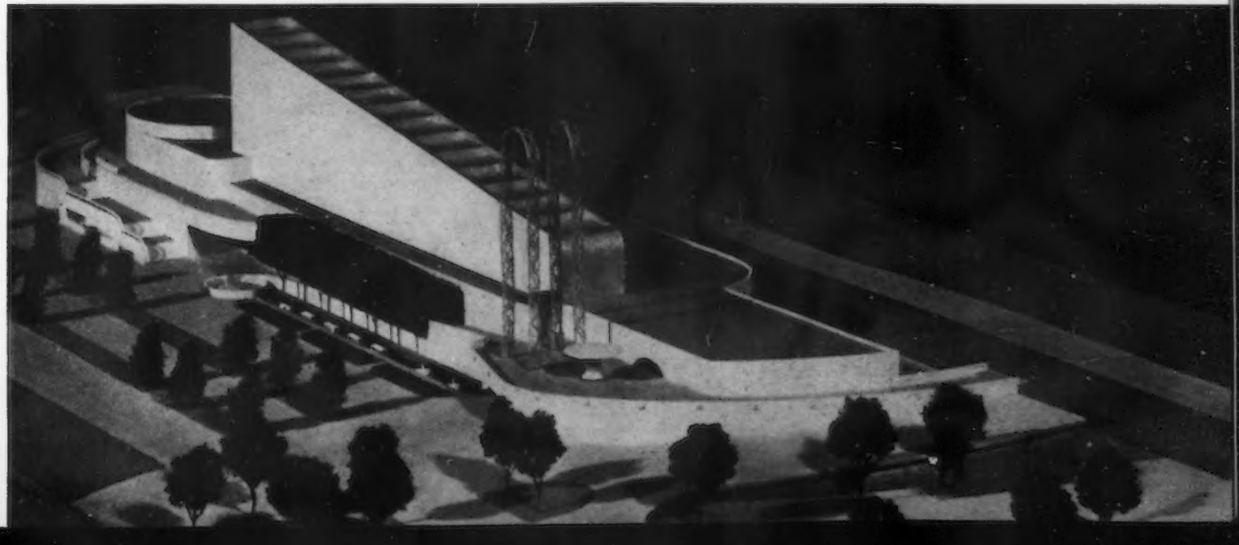
"1—To bring about the effective organization of the working men and women in America regardless of race, creed, color or nationality and unite them for common action into labor unions for their mutual aid and protection.

"2—To extend the benefit of collective bargaining and to secure for the workers means to establish peaceful relations with their employers, by forming labor unions capable of dealing with modern aggregates of industry and finance.

"3—To maintain determined adherence to obligations and responsibilities under collective bargaining and wage agreements.

"4—To secure legislation safeguarding the economic security and social welfare of the workers of America, to protect and extend our democratic institutions and civil rights and liberties,

THE $325,000 Textile Building covers an acre and a half of ground adjacent to the Long Island Railroad and two Fair entrances. It will contain displays of clothing fabrics, home-furnishing materials, patterns and textile machinery. Period costumes and furnishings and actual fabrication of cloths by power and hand methods will be shown. The end wall of the "fin" which is the structure's most striking architectural feature, will be used as a screen on which 5-min. movies will be flashed. o o o



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Bridges the

Above: No mid-day fatigue in producing work on the new 10″ Monarch. It operates as conveniently from a sitting as from a standing position.

Below: The lathe has the "feel" the tool maker likes. It just fits the average size man.

NEW 10″ SENSITIVE PRECISION LATHE

THIS newest Monarch development bridges the gap between the bench precision type lathe and the smallest floor type tool room lathe. In most tool shops, work is being done on larger, more cumbersome, higher horse-powered lathes—which can be machined in less time, with greater precision, less operator fatigue, and for far less cost on the 2 H. P. Monarch 10″ Sensitive Precision Lathe. It combines most of the advantages of the bench precision type lathes with entirely new functional design features of the complete floor type precision tool makers' lathes.

The knowledge gained from years of users' research is represented in this lathe. Surveys have been made in many of America's finest tool shops. Users told us that they wanted features like these in this new lathe:

> A more complete working range of *speeds, feeds* and *threads* than is obtainable in bench type lathes; Centralized controls so the operator can work from either a standing or sitting position, with almost effortless, fingertip control; Enough power and stamina to handle most of the work now done on larger lathes; And so designed that original extreme precision will be retained through years of service.

Monarch has given all this and more. A thirty-two-page catalog is now ready. Deliveries will start after January first.

Colored 16mm motion picture films, 100 feet in length, completely titled, showing the FLAME HARDENING of a Monarch lathe bed, are being loaned, without obligation, for exhibition to technical societies, industrial groups, or other meetings where this Monarch development may be of interest. Write The Monarch Machine Tool Company, Sidney, Ohio, if you desire to borrow this film, or, a film showing the application of AUTOMATIC SIZING to Monarch lathes.

A catalog fully describing work which may be done on the Monarch-Keller controlled lathe will gladly be sent to anyone interested.

THE MONARCH MACHINE TOOL CO., Sidney, Ohio, U.S.A.

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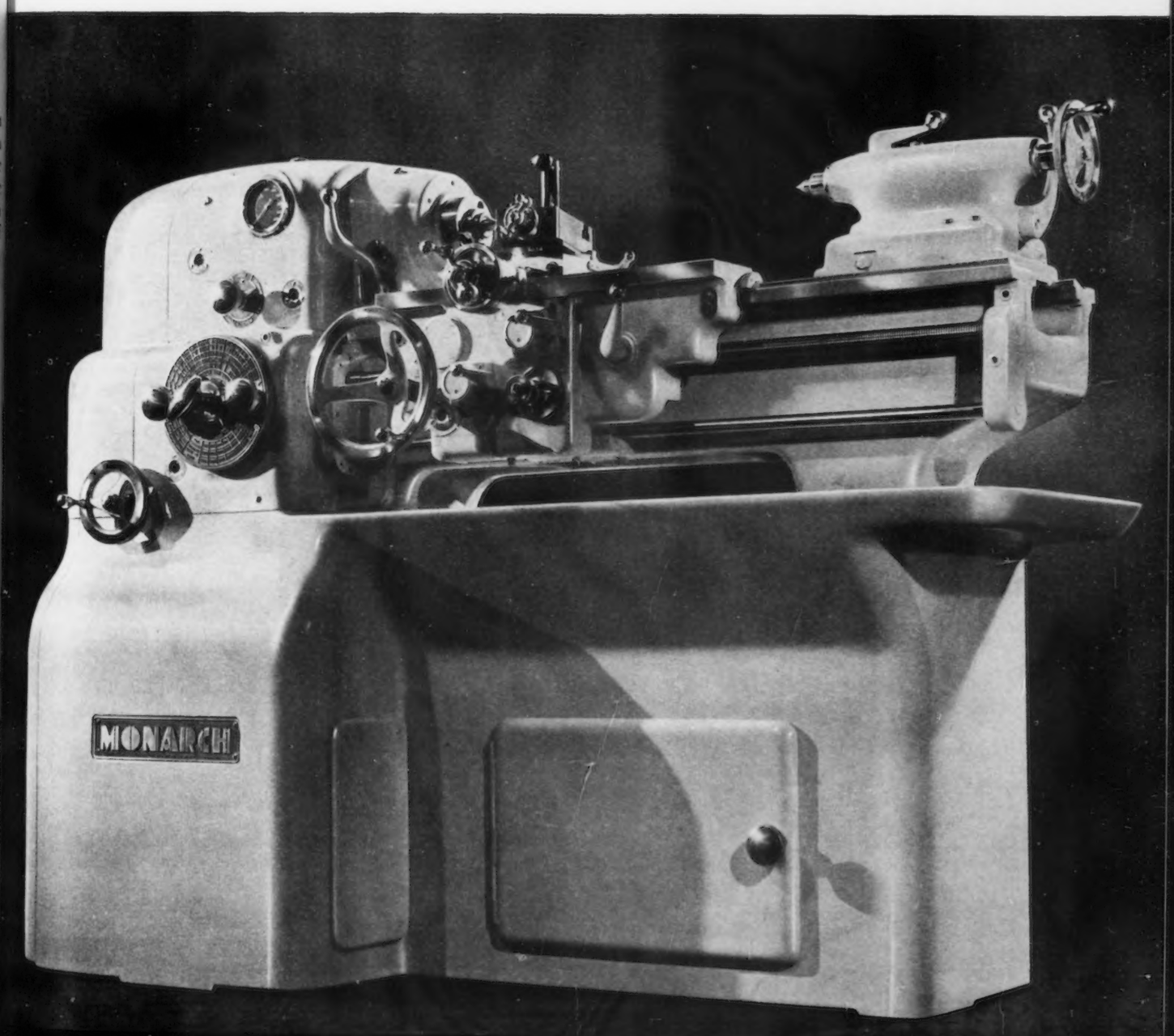
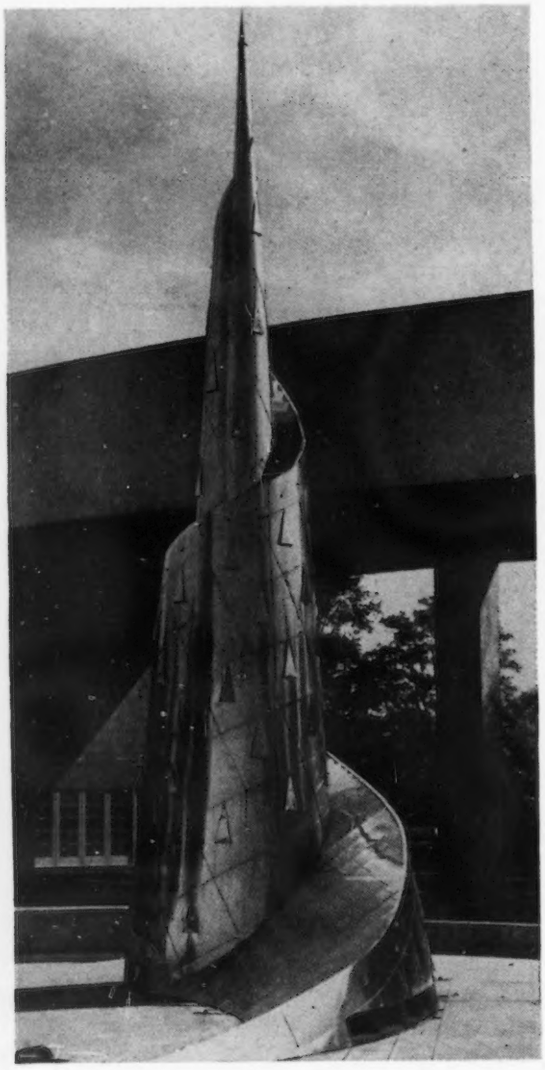
Chalk up Another for **MONARCH**



and to perpetuate the cherished traditions of our democracy."

What Mr. Lewis hopes to get for his followers in the way of income was revealed in the convention's seven-point recovery program. "We would provide an average of $3,000 to $5,000 a year to every productive worker," Mr. Lewis said. "The difficulties that stand in the way of realization of such a welcome state are false and artificial. The workers are available, the plants and productive equipment stand ready, and no one doubts that there is the desire to use these products."



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THIS stainless steel fountain is a striking example of one of the many uses of metal for decoration at the New York World's Fair. The fountain stands in the court of the Science and Education Building.

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The Union and Machine

Ignoring the question of how the $5,000 incomes are to be paid, the CIO leader declared for "regulation of the introduction of machinery in order to protect gains made by unions in wages and hours. Such a program does not mean opposition to economic progress and technological change. It means that such progress must be regulated so that it will benefit, not destroy, the system."

Just what system the CIO desires is still a matter of doubt for some observers, despite protests of belief in the nation's traditional democracy. Joseph Curran, president of the CIO National Maritime Union, who denied that he is a Communist on Feb. 17, 1938, added to the uncertainty as to the CIO's position when he said that:

"The Communist party has done more for the worker in the industries of the country, regardless of what their motives may be in the long run, than any of the so-called and self-appointed liberal agencies existent to date."

A statement by C. A. Hathaway, editor of *The Daily Worker*, sheds some light on the subject as far as it concerns the CIO's United Automobile Workers Union, the organization in which the allegedly Communistic sitdown strikes were held. "The Communists have played a constructive part in the upbuilding of the UAW," said Mr. Hathaway. "From the beginning of the auto workers union the Communists have proposed strikes only when such strikes were necessary." Ninety per cent of the registered membership of the Communist party, according to Mr. Hathaway, are active trade unionists.

This expression of pride by a Communist leader fits into a declaration last December by Homer Martin, president of the UAW, that there was an "intelligent, knowing attempt by some people within the CIO to turn the whole CIO over to the Communist party, and that certain CIO organizers were appointed for no other reason than that they were Communists."

There is evidence that some of the CIO's left-wingers seemed to feel that 1938 was not too early to attempt to overthrow the American system of free enterprise and the records show that UAW leaders proposed to President Roosevelt last February that the Federal Government take over the big industries. This extraordinary appeal to the President of the United States said:

"We . . . respectfully urge that you have formulated and urge upon the Congress the passage of legislation requiring our basic industries to function in the public interest, on the basis of limited profit and low prices per unit of output, unrestricted expansion of production and complete reemployment, with higher wages of pay and shorter hours of work of all those able and willing to work."

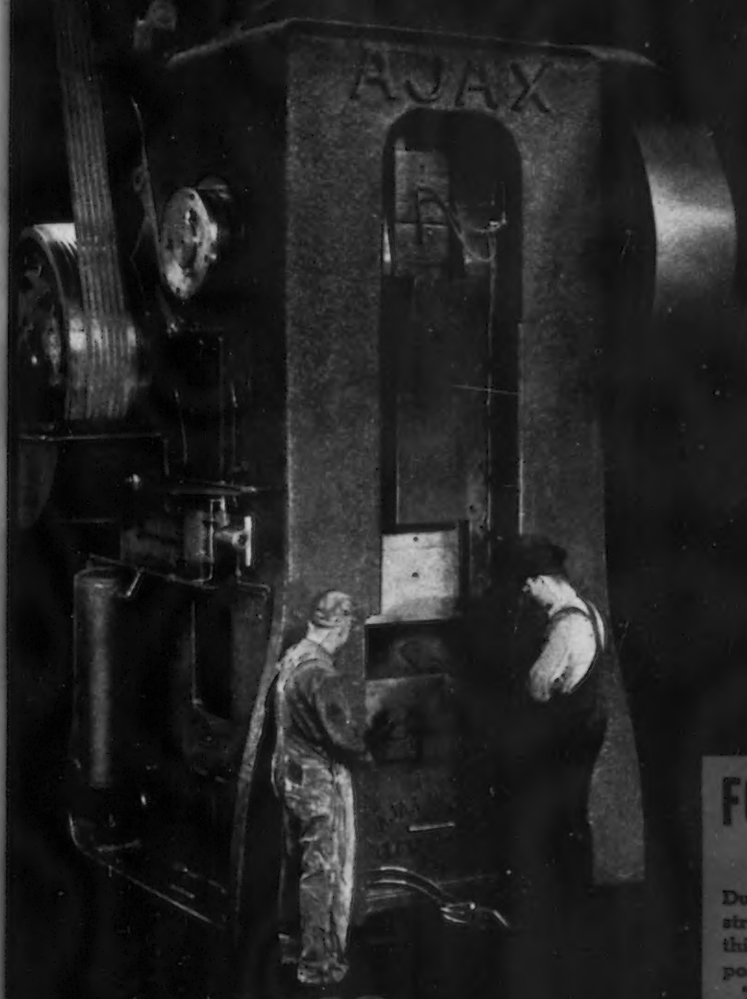
Similarly enlightening is a recent explanation by Earl Browder, secretary of the Communist party, that "the Communist party of the U. S. A. is based upon the fundamental program of the revolutionary socialist reorganization of our country, that is, the assumption of ownership and operation of the national economy by all the people, acting through their state organizations, for the benefit of all the people."

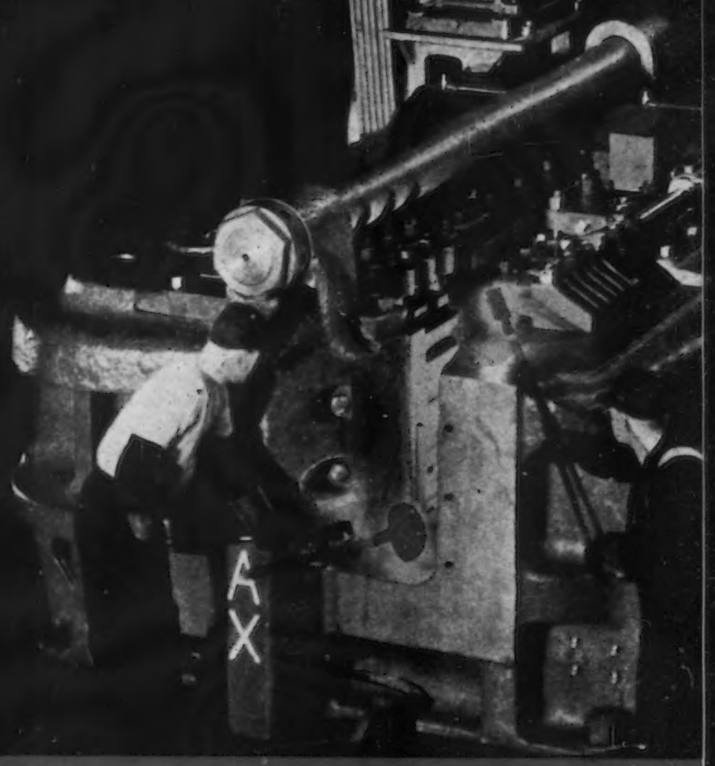
Counts on the New Deal

While the AFL probably made the greatest gains in dues-paying membership during 1938, the CIO made the news, chiefly because it retains the support of the New Deal, exerted

(CONTINUED ON PAGE 175)

AJAX





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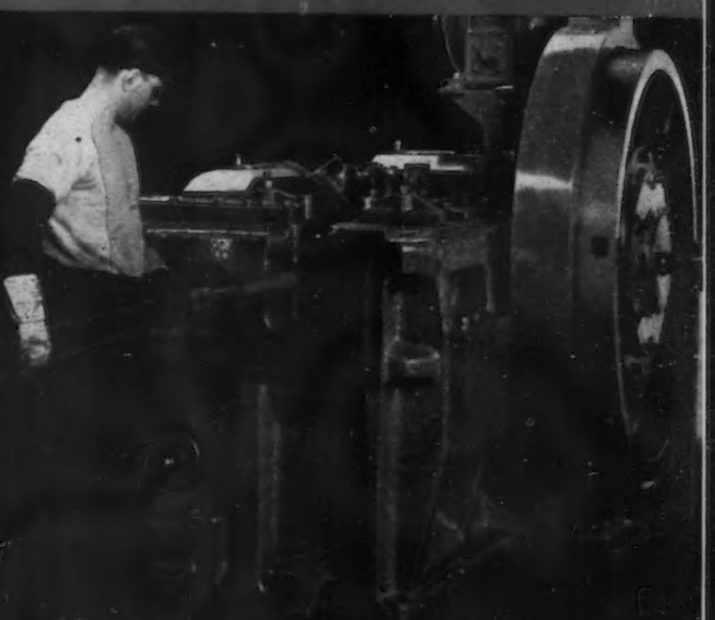

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Steel Prices AND STEEL PRODUCTION *in* 1938

PRODUCTION of steel ingots and pig iron in 1938 was the lowest since 1934. Totals for both products were only a little more than half of the 1937 figures.

Output of open-hearth and bessemer ingots (December estimated) was about 28,000,000 gross tons. Official figures will be issued by the American Iron and Steel Institute this week. With the addition of estimated 500,000 tons of electric and crucible steel, the year's total for all grades will be about 28,500,000 tons.

Pig iron output (including ferromanganese and spiegeleisen made in blast furnaces) was less than 19,000,000 tons. Actual figures for December are published elsewhere in this issue.

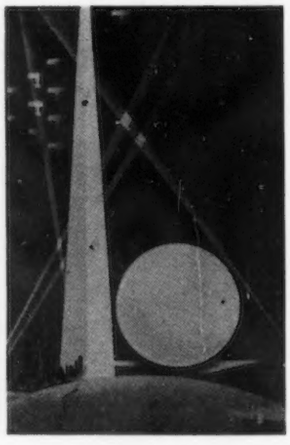
Heavy inventories carried over from 1937 accounted in part for the poor production in the early part of last year, but the effects of other depressing factors are shown in the fact that the average ingot output for the two years 1937 and 1938 was barely more than 56 per cent of capacity.

One of the most depressing factors was the lack of important railroad buying. Another was the large falling off in automobile production as compared with 1937. It is estimated that the 1938 total may be about 2,600,000 cars and trucks in the United States and Canada (smallest since 1933) compared with 5,016,437 in 1937. Although building construction contracts went above those of 1937, much of the business was concentrated in the latter part of the year. Tin plate production was materially lower than in 1937, while general lines suffered from the business inertia that prevailed during most of the year. This inertia was a result of the lack of confidence caused by discouraging policies of the Washington Administration and by political disturbances in Europe.

The year 1938 will be remembered longest, however, because of the drastic price changes which occurred, particularly the elimination of basing point differentials.

Price Movements in 1938

During the early part of the year steel companies showed no inclination to accede to pressure for lower prices, which were defended publicly and privately as quite reasonable in view of the high labor costs. In a statement before a committee of the United States Senate, Benjamin F. Fairless, president of the United States Steel Corp., said that "prices cannot be reduced without a corresponding reduction in costs, of which wages is the most important part." At the same time a statement was made by Philip Murray, head of the Steel Workers Organizing Committee, that wage reductions would not be accepted by organized steel mill labor.



President Roosevelt and John L. Lewis joined in the general discussion of steel prices. The President, in a prepared statement, said "The steel industry cannot make a profit at 30 per cent capacity, but it can at 50 or 55 per cent of capacity." Lewis declared it would be economic suicide for the steel industry or other mass industries to slash wages.

While the question of wages and prices was thus being constantly agitated, officials of the United States Steel Corp. and the Steel Workers Organizing Committee arrived at an agreement early in February whereby wages were left unchanged, but a loophole for subsequent action was provided in a clause which made it possible for wage reductions to be put into effect on 20 days' notice if such action were deemed necessary or advisable.

The attacks which were made on the steel price structure, however, put buyers on their mettle particularly in the automobile industry, where a break of $4 a ton in cold rolled sheets came almost simultaneously with the renewal of the wage agreement. This reduction was recognized officially in the announcements of second quarter prices through a reduction of $2 a ton in the base price and the elimination of an oiling charge of $2, but prices on other products were unchanged excepting commodity cold rolled strip, used mostly by the automobile industry, which declined $2 in conformity with the decline in cold rolled sheets.

Considering the small volume of demand, steel prices held fairly well during the second quarter, but hidden concessions were the subject of gos-

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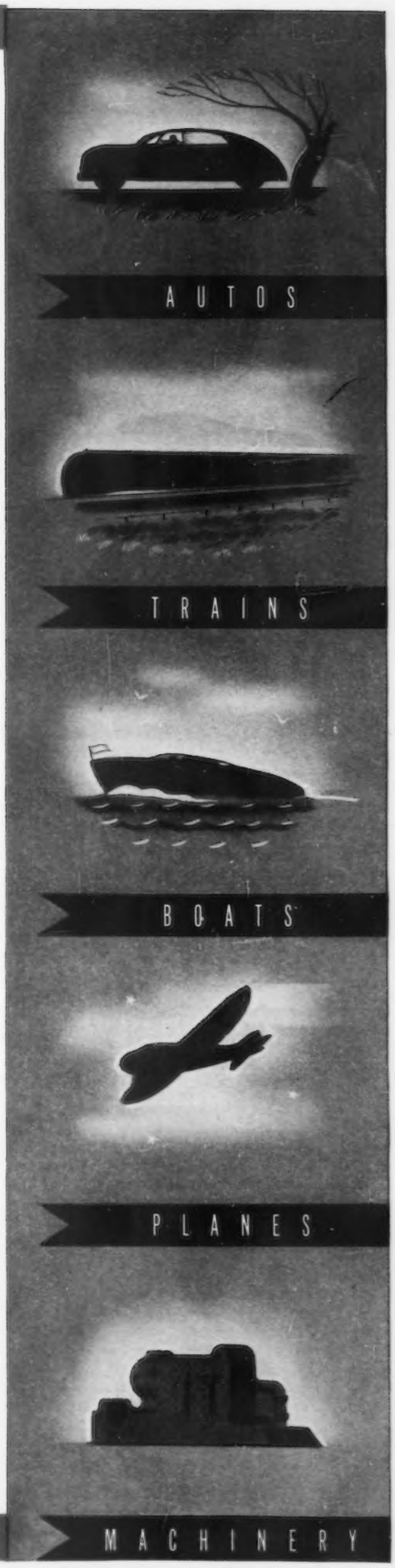

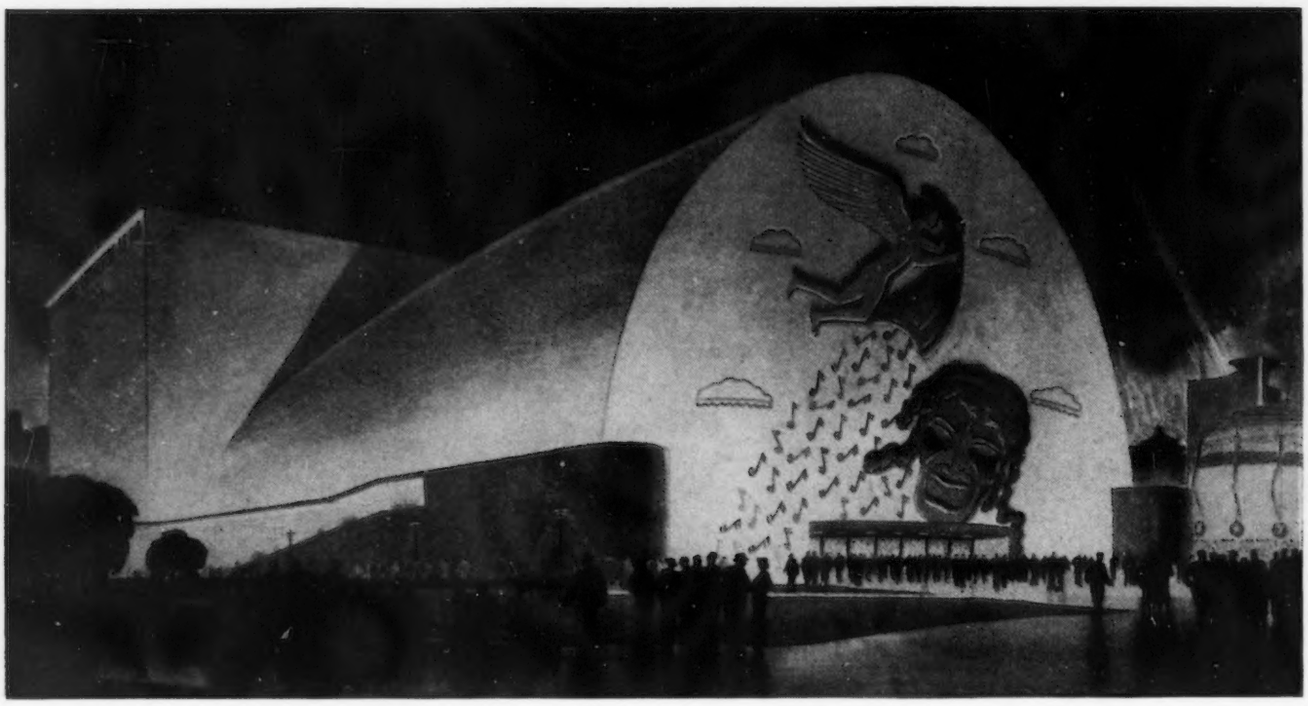

THE $350,000 World's Fair Music Hall will seat 2,500. The auditorium is egg-shaped, without balconies or interior columns, thus affording perfect sight lines and acoustics. A dominant feature is a box-like stage house, rising to a height of 80 ft. It is of modern functional design, of fireproof construction, air conditioned and equipped with latest stage mechanisms and appliances.

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sip, which could not easily be verified. Late in April the American Can Co. focused attention sharply on the tin plate price situation by a letter sent to its customers in which it was charged that its competitors were receiving price concessions. This letter resulted in an unprecedented action in November by the steel companies, namely the rebating of 25c. a base box on all tin plate shipped at $5.35 during the period from Jan. 1 to Nov. 10, 1938. On the latter date the official price was reduced from $5.35 a base box to $5, and the concession to $5.10 for the period up to Nov. 10 immediately followed. It was estimated that the rebates cost the steel companies $5,000,000 or more.

During the early part of the year the criticisms of steel prices by Washington authorities were frequent and vociferous. In his monopoly message to Congress late in April President Roosevelt singled out the steel and cement industries for special attention in declaring that "proof by the Government of identical bids, uniform price increases, price leadership, higher domestic than export prices, or other specified price rigidities, might be accepted as prima facie evidence of unlawful actions." Then

ONE of several entrances to the General Motors exhibit at the New York World's Fair will be the special diesel locomotive entrance as shown below. A complete 3600-hp streamlined diesel locomotive will be on display for visitors to inspect. The exhibit, to be known as "Highways and Horizons," has been designed by Norman Bel Geddes.

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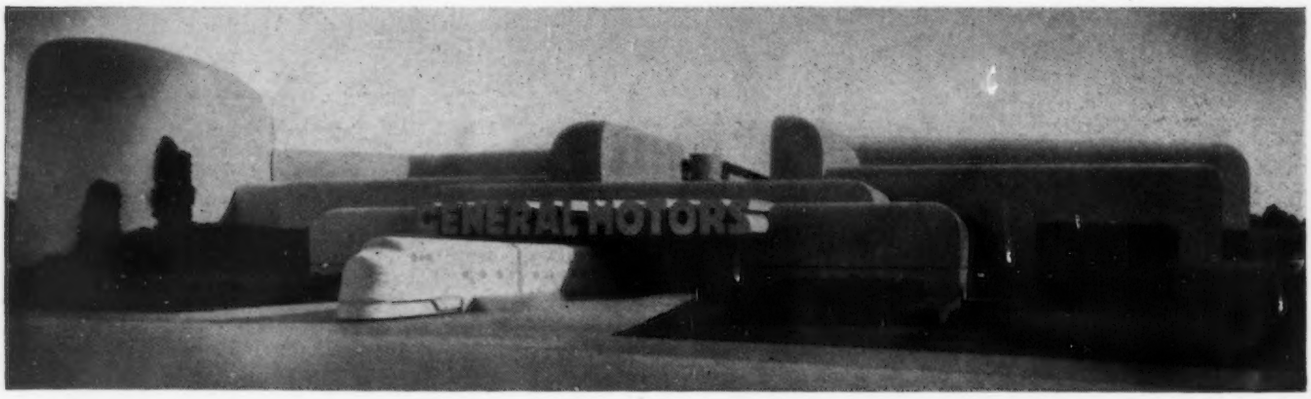

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   Syracuse, N. Y. REX TMO
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came an attack from another quarter in the guise of a friendly suggestion. General Hugh S. Johnson, the guest speaker at the annual banquet of the American Iron and Steel Institute on May 26, made the wholly unexpected suggestion that the steel industry reduce its prices.

Just a week before this meeting the Carnegie-Illinois Steel Corp. had announced continuance of second quarter prices into the third quarter, with the single exception of a reclassification of flat rolled products whereby inconsistencies that had developed as a result of the widespread development of the continuous sheet-strip mill were eliminated. A single base for hot rolled sheets, a single base for cold rolled sheets, a redefinition of hot rolled strip and tin mill black plate as to sizes and gages, accompanied by new lists of extras for flat rolled products, were included in a sweeping change in selling and pricing practices for these commodities. A supplementary price announcement reduced the price of galvanized sheets $3 a ton. Meanwhile, price weakness developed in other products, and there was formal recognition by the mills of a $5 a ton decline in reinforcing bars and one of $3 a ton on drum sheets.

Basing Point Changes

This price weakness brought about a surprising action on the part of the Carnegie-Illinois Steel Corp. on June 24 in reducing prices on nearly all products $3 or $4 a ton and announcing the elimination of basing point differentials at Chicago and Birmingham, which increased the reductions to Southern buyers as much as $6 and $7 a ton. Other companies set up new basing points, the final result being the most radical alteration of steel selling and pricing that the steel industry has ever experienced.

For weeks the selling and buying branches of the industry were in a state of bewilderment over the rapid change in their long-established practices.

Rumors of wage reductions by some steel companies quickly followed. A few small companies did make reductions, but the movement did not spread to the more important producers. Possibly as a move to stem such action, the Federal Government took a hand in the situation by calling a conference on wages for July 25 under the auspices of the Public Contracts Board of the Department of Labor, the outcome of which some months later, after exhaustive hearings, was the announcement of a minimum wage of 62½c. per hr. in the North and 45c. in the South. Protests from small steel companies poured in after this announcement was made.

The prices that were announced for the third quarter were affirmed for the fourth quarter excepting railroad materials, on which there were reductions of $2.50 a ton on heavy rails and $2 to $5 a ton on various track accessories.

Price stability did not extend very far into the fourth quarter, however. In October there was a break of $4 a ton in prices of sheets and strip, followed by another cut of $2, or $6 in all, and when these low prices were withdrawn about two weeks later all buyers were given an opportunity to

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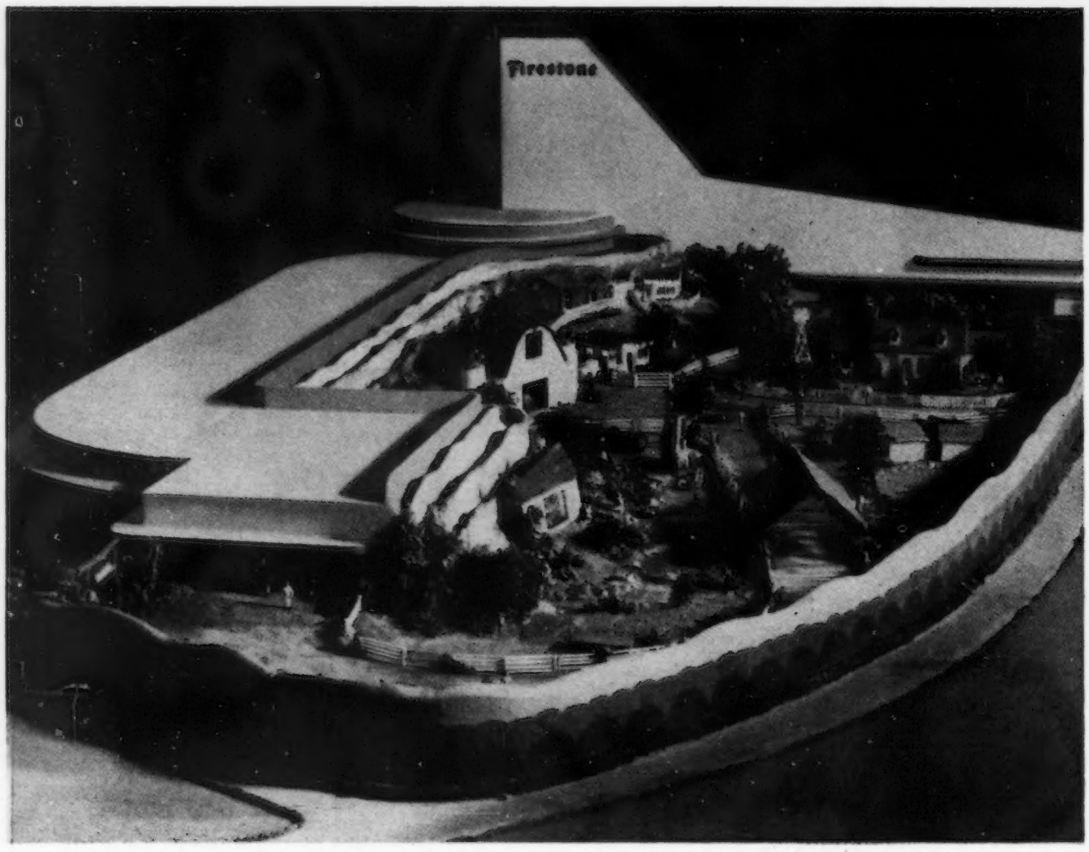

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THE Firestone Building and exhibit will house a tire factory actually in operation and producing a finished tire every 4 min. The outdoor section will show how an American farm has become modernized.

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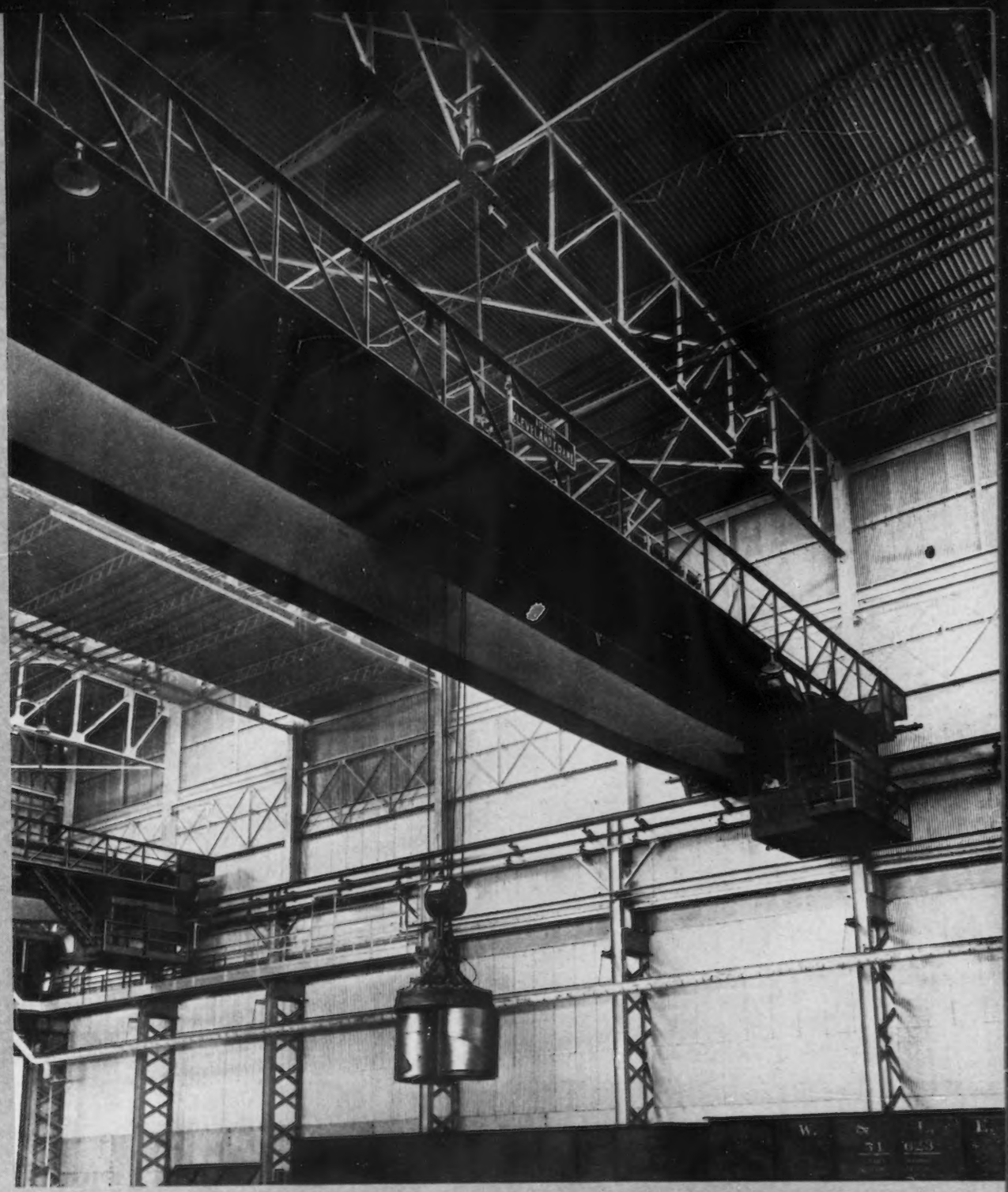

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By F. J. OLIVER
Associate Editor, THE IRON AGE

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A HEALTHY state of fundamental design competition that is bound to benefit the user exists within the machine tool industry. Certain general objectives are recognized, such as increased accuracy, finer finishes, increased productivity, and wider ranges of speeds and feeds to take care on the one hand of the high cutting speeds available with cemented carbide tools and on the other the slower cutting speeds necessary with some of the very tough alloy steels. But the means of attaining these general objectives vary widely and sometimes are approached from diametrically opposite directions.

There are, for example, those who predict that hydraulic power in one form or another eventually will be applied to all the standard machine tools and are proving their contention by adapting hydraulic power successfully to newer types each year. There are those who would electrify all machine tool functions and they do it successfully. There are those who combine electrical controls with hydraulic functions. There is the fourth group who would adhere faithfully to fully mechanical drives and feed movements. Each points out the weaknesses of the power elements sponsored by the other group, but each in turn advances the reliability and productive efficiency of his own functional design to meet the counter challenge. To this extent, the most important trend to be noted in machine tools is that concurrent developments are taking place along a number of widely divergent lines toward the general objective of increased automaticity without sacrifice of flexibility.

To cite specific examples of opposite approaches, one could point to the application of hydraulic power for the first time in 1938 to a vertical slotter. It has all the features of flexibility that one could expect to find in hydraulically actuated equipment. Yet not many months before a special horizontal, drawcut shaper—a cousin to the former, one might say—was built with completely electrical controls that had amazing flexibility.

Furthermore, when one of the oldest and heretofore most conservative companies puts out several lines of fully electrically controlled machines in addition to hydraulic and mechanical feed types, it is evident that a trend toward electrification is being accelerated. Such controls, comprising electrical contacts and relays for direct motor actuation, are not new. But there were plenty of "bugs" in the initial designs and there were some notable failures in service. The resurgent movement in the last year or two means, however, that most of the earlier difficulties have been eliminated. Hence leading companies are offering production equipment of this kind with full confidence in its performance ability.

Successful electrification of modern machine tools has been advanced materially through the design of modern control equipment that embodies reliability, consistent and exact operation, plus small size so as to make possible built-in control arrangements. The design of new types of limit switches, control stations and relays has been a contributing factor which, when properly applied, provide a high degree of accuracy and long life. Table reversals, for example, can be made within 0.002 in. by automatic

THIS view through the columns of the Business Systems and Insurance Building at the New York World's Fair shows in the background the Administration Building, heart of the Fair's manifold activities. Here is the office of Grover A. Whalen, president of the Fair Corporation.

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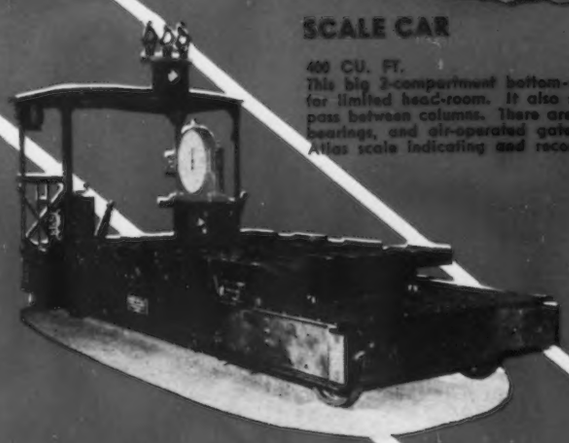

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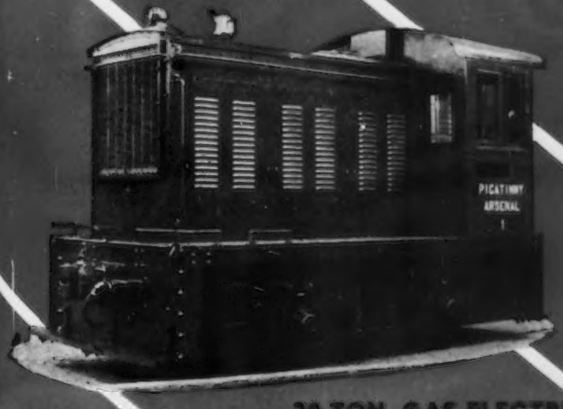
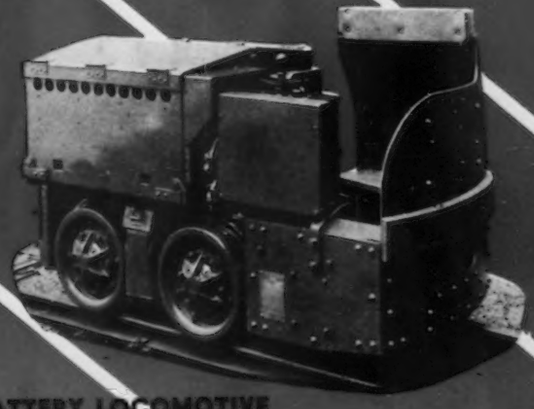
CENTER BOTTOM DUMP CAR

This single-compartment 30-ton ore transfer car has Harrigan type air-operated gates, pusher arm, electrically heated hopper. Two motors for each truck.



30-TON GAS-ELECTRIC

A standard gauge locomotive with 175 H.P. 4 cylinder engine, generator, two traction motors, and single end control. A.A.R. engine coupters, and Standard Air brake equipment.



BATTERY LOCOMOTIVE

This 11½ ton worm drive locomotive for metal mine haulage. Has safety interlock switch. A cab, with rubber lined head rest, protects the operator.

THIS vista in the Court of Communications shows how architecture, mural painting, sculpture and landscaping have been harmonized at the New York World's Fair. The mural painting by Eugene Savage on the facade is done in brilliant colors and builds its story, from Indian smoke signals to radio, around the figure of Atlas. The statue in the foreground is the work of Joseph E. Renier.

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plugging controls. Unfortunately, in the early stages of machine tool electrification, machine tool designers did not realize that trouble-free operation of electrical apparatus depended primarily upon good enclosures that kept oil and metal dust away from the control. The control was often added as an afterthought. Now we see machine tools built from the ground up for complete electrical operation. Plenty of space is allowed for mounting the controls inside the base, often with flush access doors, giving modern, clean-cut lines. These doors, incidentally, are generally electrically interlocked so that upon opening, all circuits become dead.

The application of multi-speed motors, with their reversing, plugging and inching controls have vastly increased the speed range of machine tools. Often with electric traverse controls and limit switches, plus a relatively small number of pick-off gears mounted on spline shafts, a very wide range of speeds can be had with little gearing between the drive motor and spindle. Another phase of this trend is the use of individual motor drive for each separate function, such as rapid traverse and feed.

Variable-Voltage Drive

Another phase of the machine tool electrification problem is the possibility of wide speed range, variable-voltage motor drive as applied to feed and traverse motions. Speed ranges up to 100 to 1 are available. In a special draw cut shaper for machining marine propellers of large size, for example, where it was necessary to provide a range of incremental feeds, from root to maximum diameter from 1/32 to 15/16 in., this is accomplished by an adjustable measuring relay feed drive which controls the motor so that it will make a definite, measured number of revolutions each time a feed occurs. The feed motor can be controlled to within 1/12th revolution. Improved variable-voltage drive on planers gives a 30:1 speed regulation without gear changes.

Progress is being made in the standardization of dimensions of built-in motor parts. Considerable work has been done by electrical manufacturers in establishing standard ratings for given diameters and standard pertinent dimensions for built-in motor parts. This move should accelerate the application of built-in motor drives to machine tools. The desirability of mounting motors so that they will be accessible for inspection and maintenance is being recognized, and the same principle applies to control equipment.

This discussion does not mean to imply that electrical controls in the future will replace hydraulically actuated components or the traditional mechanical drives. Some companies offer all three types. Rather the challenge of electricity will accelerate hydraulic control development, and has to some extent wedded the two in the newer forms of electrically controlled hydraulic circuits. Obviously, also, those companies that hold patents on successful hydraulic pumps, circuits and controls will naturally continue to hold their advantage and improve their design. Such competition is bound to benefit the machine tool user, by giving him greater reliability, wider flexibility and broader adaptation of the equipment.

Increased flexibility was a predominate note that permeated much of the new machine tools introduced in 1938 and is a general feature that will be carried even further in 1939 productive equipment. Stated more concisely this means a wider range of spindle speeds and a wider range of feeds, with alternate high and low speed ranges offered in the same basic machine. It means taking a general-purpose unit and providing it with automatic, simplified controls, readily selected, that will at the same time be as flexible as manual operation.

Increased flexibility is being achieved by new types of fully electrical controls, new applications of hydraulic power and the combination of electric solenoid controls to broaden the number of paces through which hydraulic equipment can be put, particularly if the process is one in which electrical measuring or timing devices can be used. In the past year, a number of standard hydraulic control panels with built-in solenoid equipment have been developed for this class of service. Perhaps the most significant contribution electrical controls have made to hydraulic actuation of machine tool elements is the almost limitless extent of interlocks made possible for safety and assurance of sequential operations, thereby increasing the reliability of the machine to a great extent. An ex-

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offer this effective self-alignment within the bearing itself. The inner race is a true spherical element, free to move without altering the contact of the CONCAVE rollers. Efficient bearing operation is maintained under all conditions. Only Shafer design combines: 1. Integral self-alignment; 2. Capacity for radial, thrust, or combined radial-thrust loads; 3. Simple adjustability.

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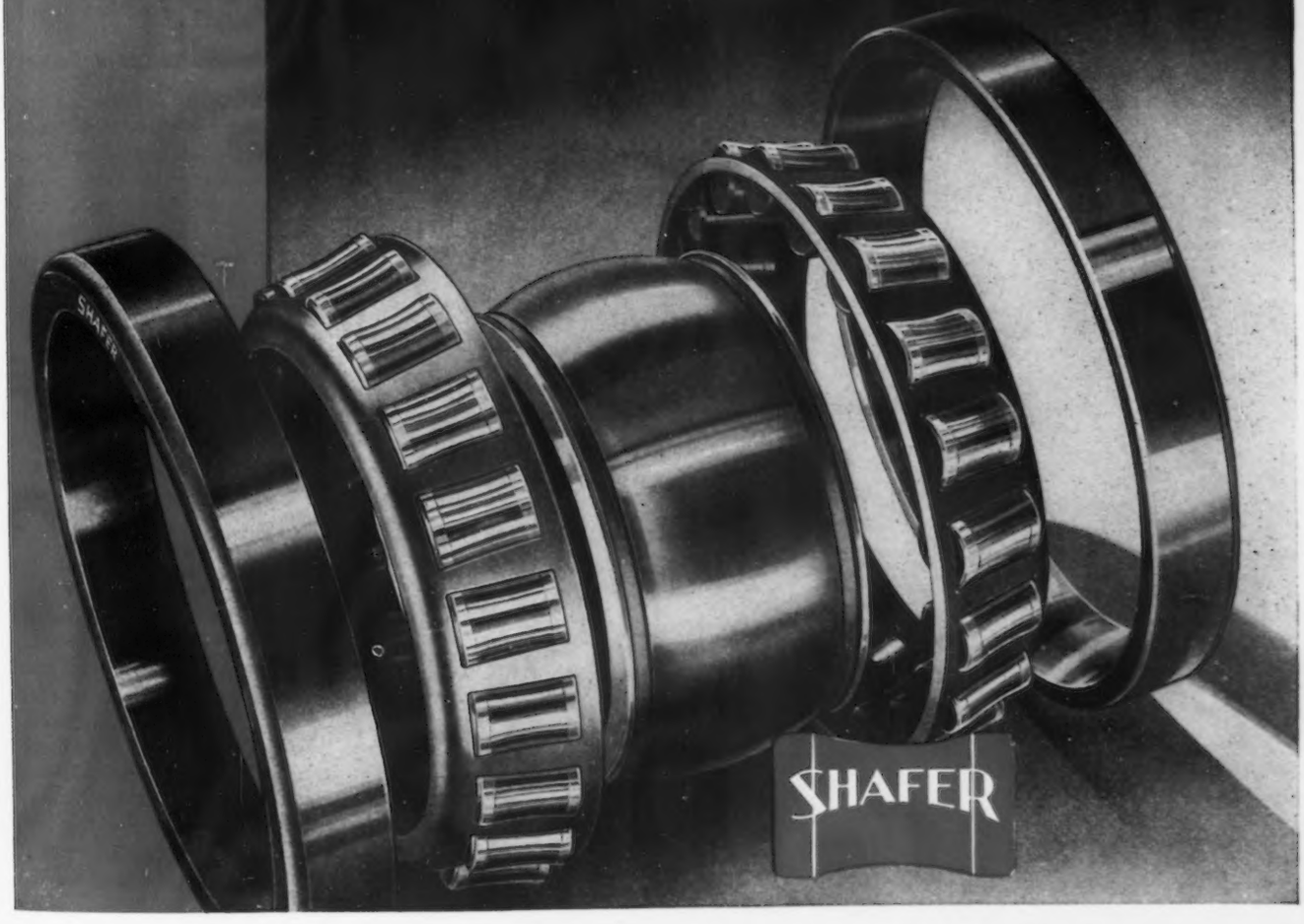


SELF-ALIGNING ROLLER BEARINGS

ample is the electric pressure switch interconnecting hydraulic clamping circuits with the hydraulic feed and traverse action.

Hydraulic motors of the rotary type, as compared with the conventional cylinder and piston unit, are finding their way more and more into machine tool drives. One example is an application on the work drive head of a thread grinder; another, to a hob spindle drive: Many grinder makers, on the other hand, are going back to d.c. motors for workhead drive, with the control rheostats built in and with face dials calibrated directly in r.p.m. In either case, the objective of speed variation in infinitely small steps is the same.

Mechanical refinements are constantly being made in machine tool components that add to accuracy, quietness of operation, freedom from maintenance, and long life. The trend toward wider use of pre-loaded ball and roller bearings on spindles is being continued, the only notable exception being that of grinding wheel spindles. Many of these still retain the bronze bearing with taper take-up or a modification thereof. Greater attention is being paid to accuracy of gear tooth forms. More machine tool builders are grinding their hardened gear teeth, or as an alternative are shaving gears in the unhardened state. Threads of lead screws are being ground on equipment especially adapted for this work. In fact, thread grinders are finding much wider use in industry, particularly since the range in work size has been greatly extended in the past year.

Sizes Getting Larger

The limit has yet to be reached in the size of machine tools, if one is to judge by the records broken each year. In 1938 a triple head boring, drilling and milling machine was built measuring 102 ft. in length and weighing about 115 tons. A huge cylindrical grinder was built to handle work up to 40 ft. long and 36 in. in diameter. Its bed is 80 ft. long. A surface grinder was built with a table 16 ft. long, small in comparison with the machines just mentioned, but the largest of its kind. Obviously all these machines were made on special order, but from the long range viewpoint, the most significant fact about them is that machines of this size can be built and assembled so as to produce work within tolerances ordinarily specified for work coming off machines of the average size.

Incidentally, the introduction of flame hardening of lathe bed ways in 1938 was largely made possible by the fact that a precision surface grinder of sufficient size could be obtained to take up to a 13-ft. bed length.

Climb Milling Gaining in Favor

The advantages of climb milling have been known for some time, such as increased cutter life and simplification of work-holding fixtures, since the cutter tends to force the work down on the table instead of pulling it off. But not every milling machine is adapted for both conventional and climb milling, since it is necessary to remove all backlash from the lead screw of the table. Hydraulically fed tables are inherently free from backlash. New designs have appeared in recent years and 1939 will probably see more milling machine builders offering equipment suited for this purpose.

Turret Lathe Trends

Fully automatic turret lathes, either mechanically or hydraulically actuated, have found favor in the past year, particularly among the aircraft industry. The type of equipment offered has been quite special in character, with the tooling often costing as much as the stripped machine. For shorter run jobs on hand turret lathes, where such elaborate set-ups are not economically justified, new forms of simplified tooling have been introduced in which rigid combination tool set-ups are involved. One company has com-

CONSTRUCTION nears completion on the American Gas Association Building at the New York World's Fair. The large tree in the foreground is one of the 10,000 planted to beautify the exposition grounds.

o o o

Everything

for Oxy-Acetylene Welding and Cutting

PROGRESS in the art of working metals requires a convenient and dependable source of acetylene, calcium carbide, oxygen, and welding and cutting apparatus and supplies. Whether you use the oxy-acetylene process for welding, cutting, flame-hardening, hard-facing, flame-softening, or steel conditioning, you can obtain promptly all the necessary products and service through The Linde Air Products Company.

Gases — Linde Oxygen is sold throughout the nation in gray-and-green cylinders. Each cylinder contains 110 cubic feet or 220 cubic feet of oxygen at a pressure of 2,000 pounds per square inch. All Linde Oxygen—whether for industrial or therapeutic use—is the same high and uniform quality.

Prest-O-Lite Dissolved Acetylene is produced from Union Carbide. For welding and cutting, it is sold in portable black steel cylinders having rated capacities of 100 cubic feet and 300 cubic feet of acetylene. For use with Prest-O-Lite appliances—heating torches, soldering irons and portable lights—Prest-O-Lite Dissolved Acetylene is sold in small steel tanks of 10- and 40-cubic feet capacity.

Calcium Carbide — Union Carbide is packed in 100-pound blue-and-gray drums. Because of its uniform quality, high gas yield, accurate sizing, and careful packing, it has been recognized as a standard of excellence for over forty years. Union Carbide, an electric furnace product, is crushed and screened to all standard generator sizes.

Carbic Processed Carbide is high-grade calcium carbide, specially treated and compressed into cakes for use in Carbic acetylene generators and Carbic acetylene flood lights. The most frequently used size of Carbic cakes is No. 20. The orange drum of 40 cakes weighs 100 pounds.

Union Carbide and Carbic Processed Carbide are readily available from warehouses, jobbers, and distributors throughout the country.

Apparatus — Oxweld, Prest-O-Weld, and Purox lines of welding and cutting blowpipes, regulators, manifolds, and outfits; Oxweld cutting machines; Oxweld and Carbic acetylene generators; and the complete Oxweld line of accessories, welding rod, and supplies—all are sold by Linde.

Service — The Linde service organization brings to users of the oxy-acetylene process practical field experience, based on comprehensive research and development facilities. This process service is available from field engineers—also through technical books, booklets, magazine articles, motion pictures, and in numerous other ways.

The Linde Air Products Company

Unit of Union Carbide and Carbon Corporation

UCC

New York and Principal Cities • In Canada: Dominion Oxygen Company, Limited, Toronto

LINDE OXYGEN • PREST-O-LITE ACETYLENE • OXWELD APPARATUS AND SUPPLIES • UNION CARBIDE

The words "Linde," "Union," "Prest-O-Lite," "Prest-O-Weld," "Purox," "Oxweld" and "Carbic" are trade-marks of Units of Union Carbide and Carbon Corporation.

pletely redesigned its hand turret lathe tools along these lines. Rigidity is emphasized to give added support for tungsten carbide tools, a feature inherent in the modern machine proper as distinguished from its ...ling.

New Conceptions of Surface Smoothness

Judged from its far reaching effects upon the standards of product performance and the means to obtain that end in the production of parts subject to wear, the commercial development of the Profilograph instrument, which originated as a laboratory apparatus in 1932 at the University of Michigan, has had and will continue to have a profound influence on standards of surface finish. Since then, Dr. E. J. Abbott has developed a portable instrument suitable for factory production requirements, known as the Profilometer, and more than a dozen of the larger manufacturers are now using this instrument in regular inspection. Several companies are specifying on part drawings definite degrees of surface finish in tolerance limits of the order of millionths of an inch.

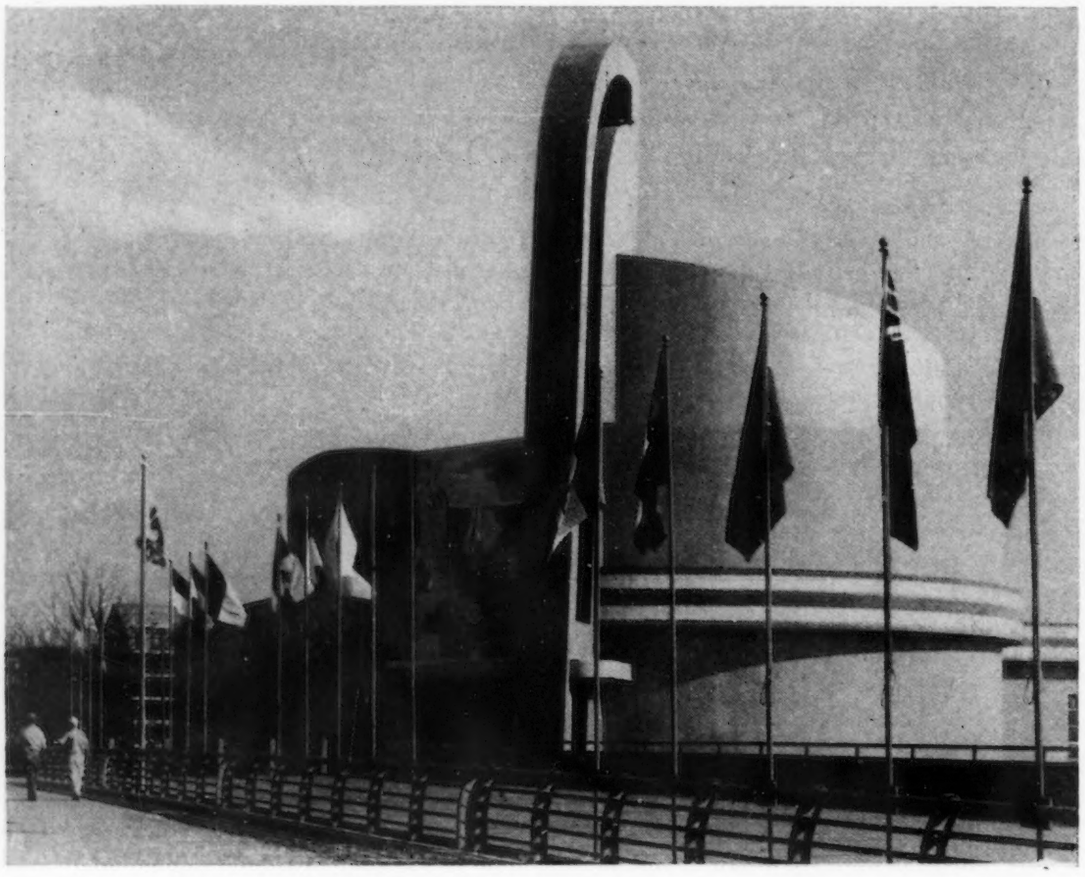
Coincident with the development of this instrument was the application of a new combination honing and lapping technique, which the originators, the Chrysler Corp., call Superfinishing. It is being applied to a wide variety of automotive parts, from wrist pins to brake drums and even the nonmetallic facing on brake shoes. The attendent publicity accorded this new process has been a challenge to the whole machine tool industry. It has already changed generally accepted ideas on surface finish and has tended to place the emphasis on accuracy and fineness of finish ahead of productivity, particularly in the instance of grinding machines.

The technique of Superfinishing comprises a light scrubbing action which in a half minute removes the microscopic projections left by previous machining or grinding operations and in the process creates no work heat of itself. Superfinish does not materially change or correct dimensional error and removes only sufficient stock to produce a selected degree of even bearing area. The process is very similar to honing, in that bonded abrasive in stick form is employed, but differs from honing through its application not only to internal bores, but also to external diameters, flat surfaces and conical surfaces. The control of heat of work, limited to less than 1 deg. temperature rise, is obtained by reason of light pressure and the use of carefully selected lubricants or cutting fluids. Commercial smoothness obtained by the technique is 2 to 5 microinch (millionths of an inch) root-mean-square variation from a geometric plane as measured by the Profilometer. Such finishes have been obtained in the past by fine honing and have been surpassed by hand lapping, obviously not a production process.

Other characteristics of the process are low surface speeds from 2 to 10 ft. per min., multi-directional motions and fractional horsepower actuation. Within half a minute the stones remove about 0.0001 in. and further finishing produces no measurable removal of surface metal.

Like most machine tools furnished the automotive industry, the initial machines built by the Foster Machine

(CONTINUED ON PAGE 178)



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THE Electrical Products Building at the New York World's Fair, as seen through flags on the Bridge of Wings. The mural painting at the left is by Martha Axley.

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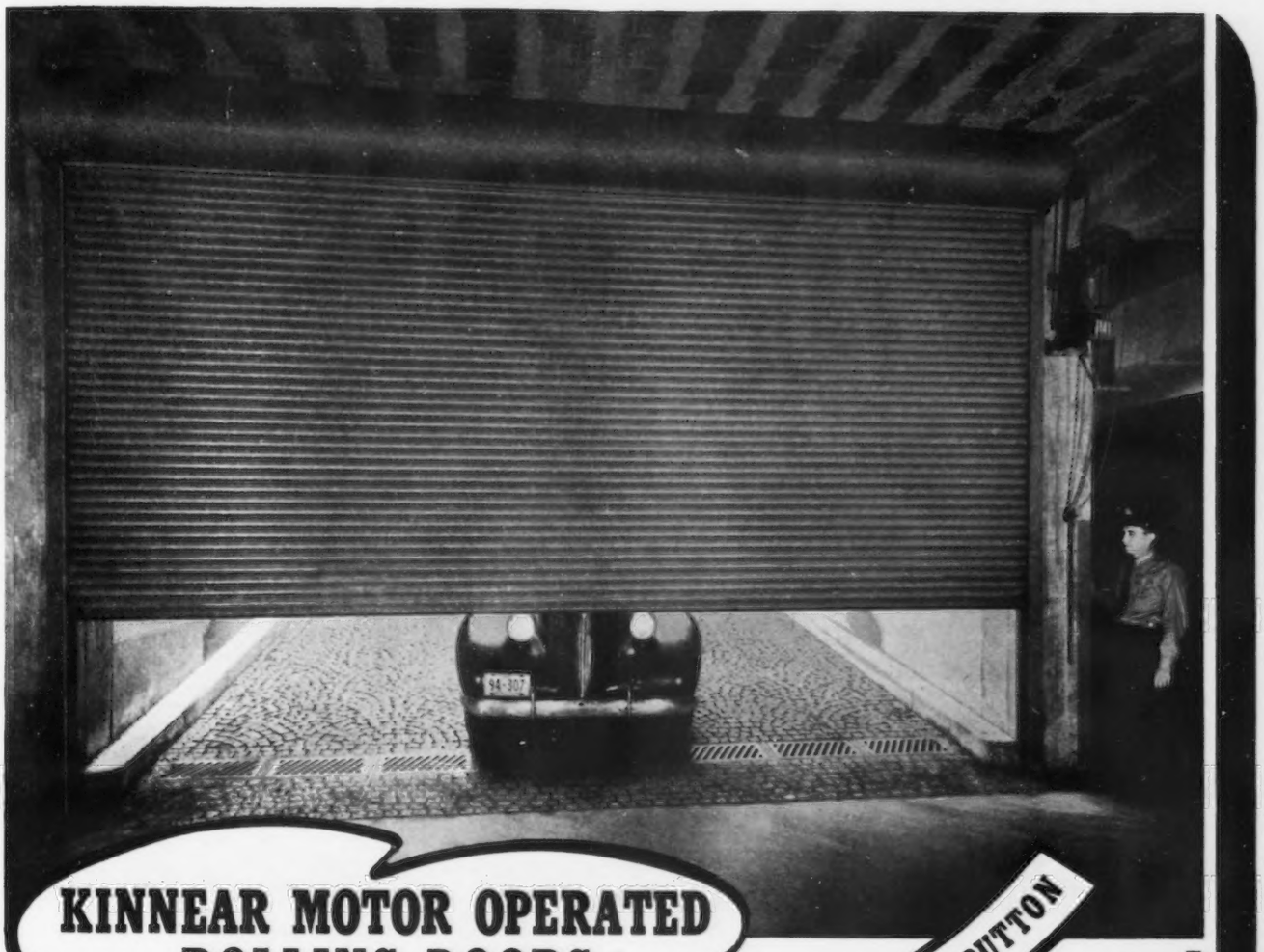


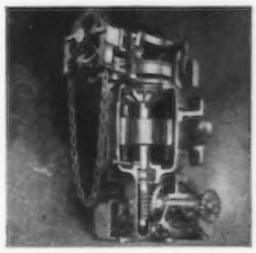
KINNEAR MOTOR OPERATED ROLLING DOORS

CONTROLLED BY A CONVENIENT PUSH BUTTON

Think of the convenience, and the savings in time and labor, of being able to operate doors quickly, smoothly and accurately from any number of convenient points — at the touch of a button!

But Kinnear Doors also offer many other advantages. They open in a vertical plane, using no valuable floor or wall space, and they coil compactly out of the way above the opening, where they can't be damaged by wind or trucks or other moving objects. The rugged, all-steel construction and sound engineering of Kinnear Rolling Doors makes long-lasting service a certainty. They will not sag, warp, or split; they are burglarproof, verminproof, weathertight and fire repellent.

All this means economy of operation and maintenance! And remember also that Kinnear makes many other types of upward-acting doors — to meet every service door requirement. So write today for the Kinnear Catalog, or for special recommendations on your door problems. There's no obligation.



You touch a button—this motor opens the door! Built for years of heavy-duty service and operates with safety and economy.

AGENTS IN ALL PRINCIPAL CITIES

KINNEAR MANUFACTURING COMPANY

1760-80 FIELDS AVENUE — COLUMBUS, OHIO

Boston, New York, Philadelphia, Washington, New Orleans, Cleveland, Cincinnati, Detroit, Chicago, San Francisco, Pittsburgh

KINNEAR

o o o

THE mural by Dunbar Beck in the court of the Business Systems and Insurance Building illustrates that a man would need six hands to complete a day's business requirements, but with the aid of modern methods he gets the work done with two. Done in rubber base paint, the mural is 75 ft. long by 19 ft. high.

o o o

Mechanical Handling LOOKS AHEAD

IN the heart of a steel mill a white-hot ingot is picked up out of the soaking pit by the gigantic thumb and forefinger of a ponderous grab hanging from a crane hoist, and dropped onto a line of conveyor rolls that feed it into the fervent embraces of the hot rolls. In an automobile plant a continuous chain equipped with flat cross plates moves slowly down an immense corridor while an army of men adds part after part to a bare chassis framework, until at the far end one of these men steps aboard, turns a switch, and the completed car rolls off the assembly line under its own power. Alongside a newly docked ocean steamship, lines of tractor-hauled trailers move across the pier and up a gangplank to disappear into hidden holds, only to emerge again in a few moments to retread their paths, laden with sacks of coffee from Brazil, tea from China, teakwood from the swampy jungles of Malaysia.

So usual are these scenes that we have lost the capacity to marvel at their wonders. Yet, within the memories of men still living, *American* coolie labor sweated to unload ships, transfer freight, store materials, feed machines and ship finished products. It was only yesterday—but a few seconds ago in the scale of time that marks the development of our civilization from a world of muscular activity to a world of machine operation—that all human effort depended upon the multiplication of the energy contained in the feeble muscular system of the human body. We have come a long way from the days when the Pyramids of Egypt were built with sheer human brawn—and the end is not yet.

Last year American industry spent hundreds of millions of dollars for mechanical equipment to replace coolie labor at the tasks of *moving* goods. Why? Because it has become increasingly apparent that the use of muscle costs more than the use of machines. Because it is everlastingly clear, after centuries of sweated drudgery, that it is more profitable to employ men to use their brains than to use their brawn, and to employ machines to take the place of the human muscle thus displaced.

No one who has been a part of this philosophical change would willingly go back to horse-and-buggy days. And by the same token, no one who has understood the basic facts which have brought about this philosophical change is willing to believe that we have come anywhere near the ultimate ideal in the mechanical moving of materials. In the metal working world of tomorrow especially there are many problems still to be solved before human muscle can be completely replaced by mechanical handling—not the least of which is the problem of creating better-paid work for the men who no longer are coolies. What may reasonably be expected as developments in mechanical handling during 1939?

To understand clearly the nature of the forces which produce trends, it is essential first to understand those forces as they are manifest in our daily work.

Handling materials is Work, no

Here's Where You Can Use Carboloy *for* GREATER PROFITS IN 1939!

CARBOLOY TOOLS

Here's an excellent example of the way Carboloy tools help to increase profit-margins. This job of milling cast iron valve bodies, using two Carboloy milling cutters, saves $276.00 every 36 hours.

STANDARD TOOLS

—standard styles of Carboloy single point tools in a wide range of sizes for all common turning, boring and facing operations. Catalog M-37.

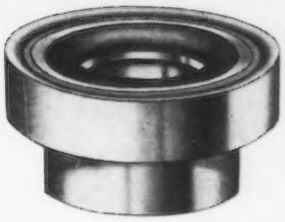
SPECIAL TOOLS

Carboloy is being widely applied on practically all types of tools in common use, including not only solid tools but all types of adjustable cutters. Milling cutters, reamers, boring tools, counterbores, combination counterbores and reamers, profiling tools, spotfacers, trepanning tools, spinning tools, forming and grooving tools—from the most simple types to the most intricately shaped tools—large and small—all are being successfully used with Carboloy tips.

GAGES

Carboloy tipped gages insure dependable accuracy over long periods of use. Reduce gage inspection time and substantially decrease scrap. Any gage can be tipped.

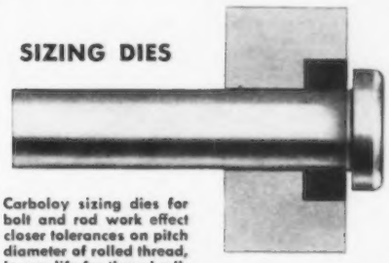
CARBOLOY DIES



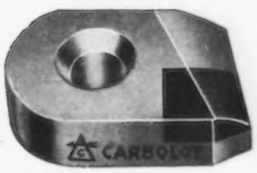
SHEET METAL DRAW DIES

For producing work within close size limits and a superior finish on all non-ferrous and steel stock. Available in sizes ranging from the smallest eyelet die up to 6" I. D.

SIZING DIES



Carboloy sizing dies for bolt and rod work effect closer tolerances on pitch diameter of rolled thread, longer life for thread rolling dies and less down time on machine. Furnished in rounds or shapes for sizing bolts, nuts, etc.



PITCH, TOOLS, COILING POINTS, GUIDES, ETC.

To increase life of all types of arbors, guides, etc., for coiling and forming operations on wire, rod and bar stock where parts are subject to rapid abrasive wear.

WIRE AND BAR DIES, TUBING DIES, SHAPED DIES

Carboloy dies for wire, bar, tubing of low or high carbon or non-ferrous stock now widely used in sizing up to 1¾" dia. Carboloy tubing dies for all drawing and sinking applications in sizes .020" to 3" diameter. Carboloy shaped dies available for practically any shape desired. Price List D-37.

CARBOLOY WHEEL DRESSERS

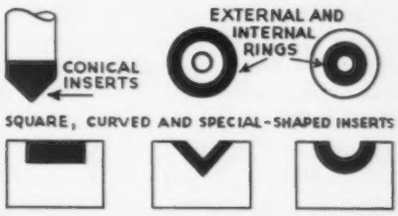
These standard dressers will reduce your dressing costs, eliminate all remounting expenses, eliminate diamond losses, simplify ordering and stock problems, and give you immediate deliveries from stock. Send for Catalog DR-38.

3 LOW-PRICED DIAMOND DRESSERS

¼" dia. . . . $9.60
5/16" dia. . . $12.60
⅜" dia. . . . $15.35

SPECIAL INSERTS FOR MACHINE PARTS SUBJECT TO RAPID WEAR

All types of machines subject to excessive wear from abrasive or corrosive action on localized areas can be tipped with Carboloy at the point of wear. Numerous applications now in use indicate that as high as 50 times greater life can be obtained. "Wear-proofing" with Carboloy is practical and profitable.



CARBOLOY COMPANY, INC.

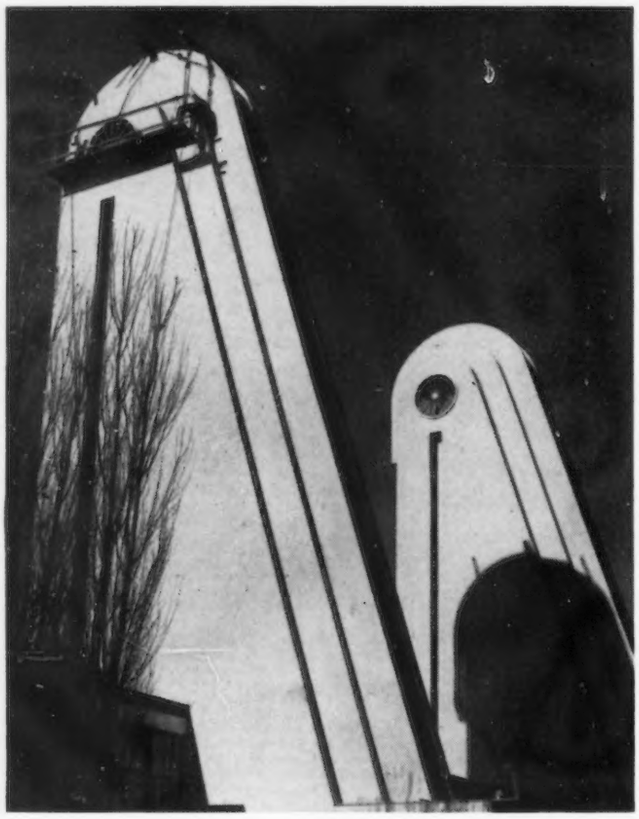
DETROIT, MICHIGAN

CHICAGO • CLEVELAND • NEWARK • PHILADELPHIA • PITTSBURGH • STAMFORD, CONN. • WORCESTER, MASS.

Authorized Distributor: Canadian General Electric Co., Ltd., Toronto, Canada

CARBOLOY CEMENTED CARBIDES

REG. U.S. PAT. OFF.



THESE pylons rise at one of the nine entrance gates of the New York World's Fair, which opens on April 30. An estimated attendance of 60,000,000 is indicated for 1939.

matter whether done by men or machines. In our school-days we were told that the rate of doing work is a matter involving three factors:

$$\frac{\text{Weight} \times \text{Distance moved}}{\text{Time}}$$

In discussing the work involved in the handling of materials, it is advisable to translate these cold, dry terms into a conception where *weight* is replaced by the idea of lifting, where *distance moved* is replaced by the idea of shifting, and where *time* is shown by the dial of a clock. Whether we use the one or the other formula, however, it is well to note that *Time*, as the lawyers say, *is the essence of the contract.*

Man's first prime mover was his own 1/10th horsepower muscular motor. Then he tamed the horse and gained a several hundred per cent increase in time. He harnesses the air and the river torrent, he developed the steam engine and the electric motor, to *multiply* his own strength, and thus *divide* his time of doing work.

But all the actual physical work that man can do is still reducible to *Lift* and *Shift;* and when this fact began to be clearly recognized, he started to harness mechanical forces to enable him to *reduce the time* of lifting and shifting. From this single conception has come all the developments in the mechanical moving of materials.

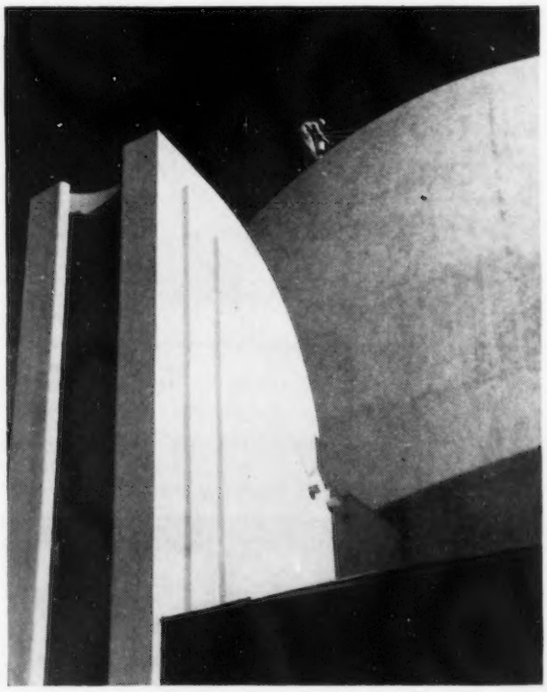
Now, the trick in making mechanical handling equipment pay is to make it work all the time. Idle equipment costs more than idle human labor; working mechanical equipment costs less than working human labor. Thus, once again we face the basic factor of Time as the essence of the contract—as is proved by all mass production enterprises.

Consequently the real reason which underlies the widespread acceptance of mechanical handling equipment today is not that it displaces human labor, but that it saves time. In saving time, it saves money; for the time during which labor is employed costs money, the time during which production equipment and the plant in which it is housed is *not* utilized to full capacity costs more money, the time during which raw materials are held unturned into finished product likewise costs more money, and the factor of overhead expense and idle invested capital, which goes merrily jogging on regardless, costs the business the most money.

Time IS Money

In brief, as the proverb so truly says, "Time is Money." And any careful analysis of manufacturing costs will prove this conclusively. Hence, without fear of contradiction, this statement may be held to be a self-evident truth.

In nine cases out of ten, the greatest single item of saving which can be made in manufacturing today is in the reduction of time between raw materials and finished product. And in the same nine cases out of ten, the logical way of reducing manufacturing time is to replace coolie labor with mechanical handling equipment. That this is



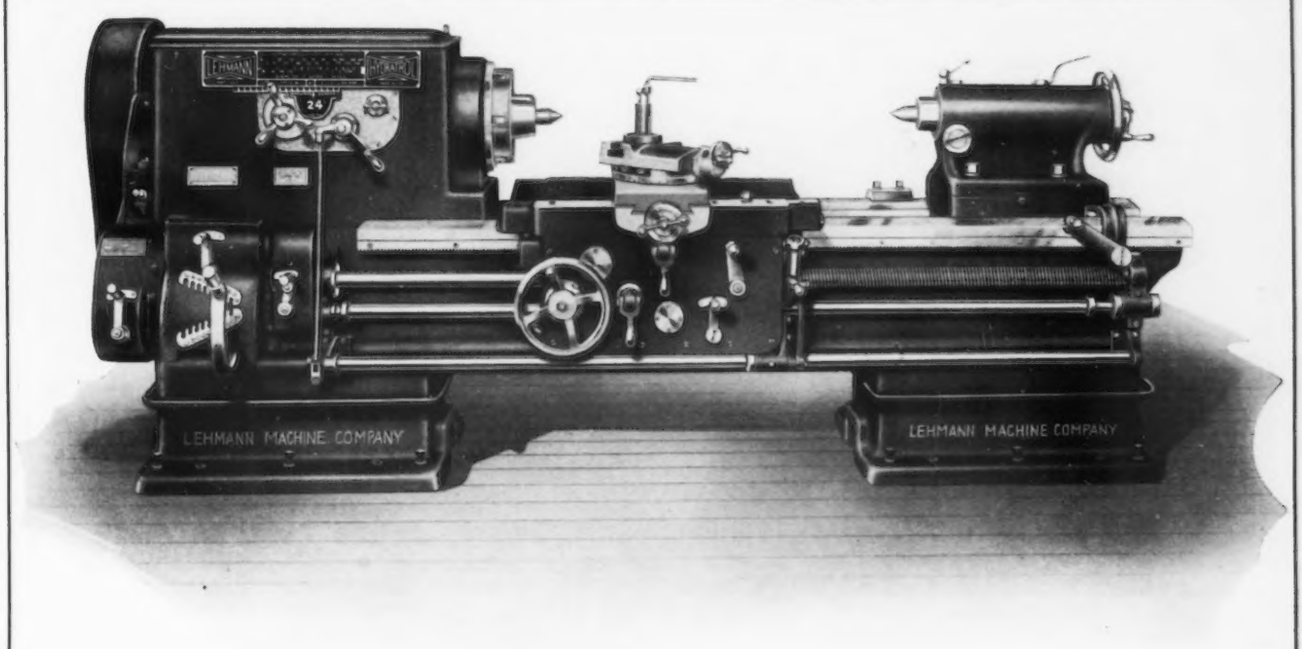
A MAN, a paint-brush, a dome—together they make a good picture and, when coordinated in a great central plan, they help to make a great New York World's Fair for 1939. The painter above is putting a protective coat on the Heinz dome of Food Building No. 1, one of three Fair buildings devoted to man's number one necessity.

THE HYDRATROL LATHE

EXPECTANCY HAS MORE THAN BEEN FULFILLED IN SPEED OF PRODUCTION THROUGH

EASE, SPEED AND SIMPLICITY OF OPERATION
UNEQUALLED CAPACITY FOR POWER TRANSMISSION
FREEDOM FROM STOPPAGE FOR ADJUSTMENTS
ABSENCE OF MECHANICAL TROUBLES
AUTOMATIC PRESENTATION OF ESSENTIAL INFORMATION
AUTOMATIC AND AMPLE LUBRICATION
PRESERVATION OF MECHANISM BY AUTOMATIC CONTROL

EXTRAORDINARY HARDNESS OF BED



24" EXTRA HEAVY TYPE

UNEQUALLED IN ALL THE ESSENTIALS FOR EXTREME DEMANDS

THE SUPER-REFINED HEAVY DUTY LATHE

THE HYDRATROL LATHE

IS BUILT IN SIZES 16", 18", 20", 22", 24", 27", 30" AND 36"

18" LARGE HOLLOW SPINDLE TYPE UP TO 7¼" HOLE

24"	"	"	"	"	"	12"	"
27"	"	"	"	"	"	13"	"
30"	"	"	"	"	"	16"	"
36"	"	"	"	"	"	18"	"

LEHMANN MACHINE COMPANY

CHOTEAU AT GRAND, ST. LOUIS, MO.

so must be evident from a consideration of the following analysis.

There are but three ways of reducing the time consumed in the processes of manufacturing:

1. To speed up the machines or to replace existing equipment with faster operating equipment.

2. To schedule the flow of operations so as to eliminate all lost motion.

3. To handle goods and parts between manufacturing operations, faster.

But the key to all this lies in a single factor—materials handling. For machines cannot be operated faster unless means are employed to feed them more rapidly and to take away the greater volume more rapidly after the machine operation is completed. And straight-line scheduling of operations depends almost completely on materials handling principles, just as the handling of goods between manufacturing operations, faster, depends upon mechanical handling equipment.

Increasing Manufacturing Tempo

No more brilliant example can be cited than the manufacture of automobiles. The major reason why we are today a nation of motor car owners is that a product which a generation ago was a rich man's plaything has been made the poor man's Pegasus, by cutting the time of production. In the automotive industry, production has been organized on the basis of the assembly line, which is nothing more nor less than a high order application of mechanical materials handling principles.

In mass production industry after mass production industry, similar principles of organization have shown the way to the reduction of manufacturing costs. But other than mass production enterprises have taken up the gage of battle likewise. And wherever we find, in any industry whatsoever, a notable reduction in manufacturing costs as compared with the costs of a generation ago, there also do we find, almost inevitably, organization of effort based primarily on the substitution of machines for muscle, especially in handling.

Three Principles in Handling

Now, mechanical handling equipment is reducible to three principles. All systems of mechanical handling comprise one or more, or combinations of one or more, of these three principles, as noted below:

A. Where goods are to be moved continuously from one fixed point to another fixed point, the use of conveyors is indicated.

B. Where goods are to be moved intermittently from point to point within the limits of a fixed open area, the use of cranes and hoists is indicated.

C. Where goods are to be moved intermittently from point to point without regard to limitations of area, the use of mobile equipment such as wheeled hand trucks, industrial trucks and tractor trains, industrial railways or commercial trucks, is indicated.

Considerations of the present state of development of all these general types of equipment, taken together with consideration of the basic factors inherent in the philosophy of materials handling as previously indicated, lead to these conclusions as relating to what may be expected in the line of further developments during 1939 and thereafter:

More time will be saved by

1. Equipment which will operate at faster speeds.

2. Equipment which will carry larger unit loads at present speeds.

3. Equipment which will eliminate present re-handling operations.

4. Equipment which will reduce the manual control of operations to a more nearly automatic cycle.

5. Equipment which will permit the "flow" of operations to be scheduled on a more nearly "straight-line" basis.

6. Equipment which will combine two or more present operations into one.

Nowhere as yet have these ideals reached any natural limitations. Everywhere experimental work is being carried on toward these ends. Look, in 1939, for developments in materials handling methods and equipment which will still further reduce the time element of manufacturing by coordinating production processes, by feeding material to and removing material from production machines more rapidly, by bringing to a greater degree of perfection the principles of remote control, and primarily and throughout every phase of work, by replacing coolie labor with mechanical servants.

The surface has barely been scratched as yet. Millions of dollars can still be spent profitably in an untold number of American manufacturing plants, to save tens of millions of dollars now wasted through totally inadequate materials handling methods. Materials handling is a function of production, not an end in itself. It is beginning to be regarded as such a function today—but the actual possibilities must be explored with much greater care.

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THE frieze mural by Pierre Bourdelle on the drum of Food Building No. 2 at the New York World's Fair uses the technique of a mixture of sgrafitto and fresco on cement. This is a fast-drying method, requiring that the work on any part of the mural be done in an hour and a half, without hesitation or correction. The mural is 137 ft. long by 38 ft. high.

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PROGRESS

IN MANUFACTURING DRILLS AND REAMERS

IN *This* DRILLING COMPETITION

CLE-FORGE PRODUCED 1/3 MORE HOLES UNDER IDENTICAL CONDITIONS THAN COMPETING DRILLS OF EQUAL COST

"One-third more holes per useful life of the drill" becomes a 3-dimension reality when you discover what a tough job is covered in this Report made by Independent Engineers.

The material drilled is steel—a farm implement part—Brinell hardness 220-225, averaging over 70% carbon, 85% manganese. Drills dull rapidly, must be reground often. *But*—here are the unvarnished facts:

1—Cle-Forge High Speed Drills produced an average of 2544 holes per drill during a 3-year competition on identical work with other well-known makes. The latter averaged only 1912 holes per drill. Difference in favor of Cle-Forge, 632 holes per drill. 2—Each make of drill cost the same—$2.26 per drill. 3—Cle-Forge savings, therefore, equalled 74¢ per drill.

No wonder the Report adds "this manufacturer now buys Cle-Forge High Speed Drills in preference to all others!" So—how about your own troublesome, costly drilling jobs? If you are not using "Cleveland" Drills, wouldn't you, too, like to test them against the makes you are now using? It can be readily arranged.

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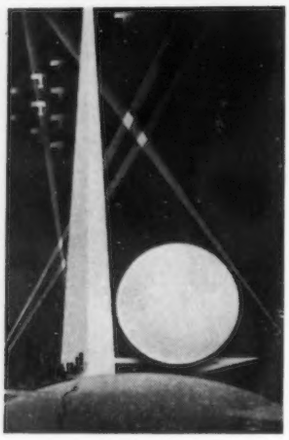


T. W. LIPPERT,

Metallurgical Editor

THE evolution of animate matter would indicate that that species survives and thrives which by some certain structural peculiarity is best able to perform some advantageous action and is capable of bequeathing this structural peculiarity to descendants. Equally is it true that metallurgy dances to the tune of a type of economic selection, i.e., some material which is more functional than an existing material, with no increase in cost; furthermore, will serve as a springboard for additional developments along the same line. Or, some process producing an equivalent product at a reduced cost, or a better product at the same cost, takes a perfectly understandable vanguard position in the race for survival.

The rules of evolution are brutally realistic, predicating as they do a continuous decomposition as the price of composition. In natural selection the decomposition is the dying out of a species lackin ; adaptiveness, which of course is at the same time aided and hindered by the workings of civilization, viz., the artificial hybridization of plants as an example of assistance, and the protection of the congenitally insane as an example of hindering. Economic selection demands the death of invested capital for still greater capital to thrive. Here again the trend undergoes some distortion. Acceleration is provided by the tremendous amounts of money spent in integrated research by large corporations, and deceleration springs from the same source, the disinclination of manufacturers to write off un-amortized material or equipment in favor of some potentially profitable development.

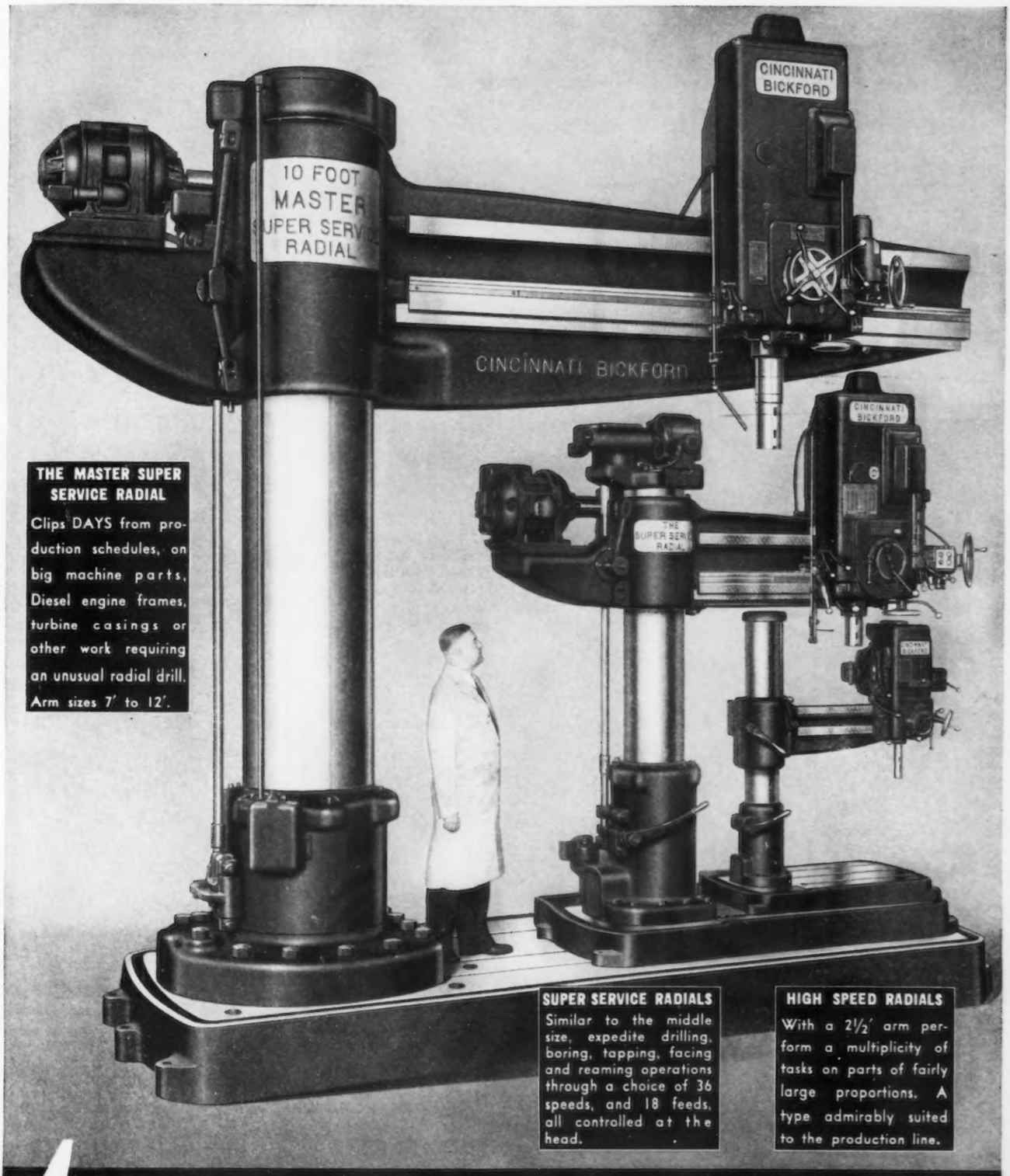
The trend is persistent, however, and can be bucked for only a limited time. Invested capital has less to fear from polity than from the metallurgist at Battelle Memorial Institute who can sign the death warrant for millions of dollars worth of existing capital some quiet afternoon; or the chemist at Kaiser Wilhelm Institute; or the inveterate home experimenter working in his cellar laboratory in Canton, Ohio; or some "crackpot" at Gary enthroned in his easy chair while his wife screams at the kids to let papa alone while he's thinking.

NATURAL selection rules the evolution of animate matter, and equally as irrevocably does economic selection order technical evolution. In either instance the anabasis, albeit irrevocable, is blurred—natural selection by the niceties of civilization; economic selection by the weight of invested capital.

There have been innumerable examples of economic selection in the metals industry. Hall's invention for the production of metallic aluminum snuffed the life from the very promising Deville-Castner process. More recently, the steel industry has witnessed cold-reduced tin plate cut the ground from under hot plate, the trend being irrevocable despite bitter underground opposition at its inception.

Granted then that cost and quality determine economic selection, there is considerable interest attached to extrapolating the development curve to see what the future promises. Blind prediction is ruled out, even though such prediction can so readily be defended by the usual trite saying that "nothing is impossible." Rather, it is essentially more correct to take established points on the development curve, that is, radical experiments that have succeeded today, and then extend the curve into the future with appropriate modesty and hesitation.

Such a curve shows definite additional shifts in tin plate manufacture and possible partial displacement. It



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shows colored steels; it shows distinct changes in the various conventional products of today; it shows far superior cold rolling rolls; it shows lower prices, and above all it shows radical changes in steel manufacture, particularly between the raw products and the semi-finished state. To examine these possible changes in detail, the following discussion will be confined to steel, and subdivided into steel production and steel finishing.

Steel Production

Faithful to the thesis that the replacement of what is inefficient is inevitable, there remains no particular danger in painting the future of steel making. And by steel making is meant the four-stage process: (1) the reduction of ores to crude iron, (2) the refining of this crude iron into steel, (3) the solididfication of the steel into ingot form, (4) and the conversion of the ingot into finished products. Of the four stages the last has of late gone through the most drastic revision, what with all the new continuous mills which are downright marvels of speed and ingenious engineering. But, ironically, stage (4) may go through additional upheavals before the other three essentially more inefficient stages shed their adherence to a conventional past.

The author, albeit of complete humility regarding the labors of countless metallurgists and steel technicians in perfecting existing processes, must nonetheless insist that within the life arc of men now living there wlll be drastic alterations in at least the first three stages of the process. This must be. The making of steel along the pattern of today is essentially too costly, slow, and unpredictable.

Attacked piecemeal, the first stage, the blast furnace, is a well-meaning behemoth which long has taken a licking in theoretical calculations on paper. And in this instance, the steel industry well deserves credit for trying to do something about the situation. Many millions of dollars have quietly gone down the rat hole of so-called direct reduction, that is, the transference of ores to a spongy, granulated iron of low-carbon content (less than 1.0 per cent C) in one step. Other millions have been spent in de-humidifying blast air, a procedure that is sure-fire on paper; and even today spot investigations are under way on the oxygen enrichment of blast, which again promises much on paper as to the speeding up of the reduction process, the minimization of coke consumption, etc.

It must be granted that the blast furnace is somewhat of a technical monstrosity, but it must also be admitted that the visible future holds no promise of this age-old method being circumvented by any direct reduction procedure. Nor does there appear much likelihood of an early revival of hysteria concerning de-humidification or a growth of hysteria about oxygen-enrichment. It may be taken for granted that both of these two niceties are technically feasible and of undisputed technical merit. But both flounder on the rocks of excessive cost, with little or no alteration of the economic angle in sight for the next decade.

But there are phases of blast furnace operation even now undergoing change or likely to shift in the near future. Too long has there been a tendency to cram almost indigestible burdens into the craw of furnaces, and there is now definite action under way to prepare burdens more sensibly, by concentrating and sintering of ores, by the sizing and careful distribution of ores, coke, limestone, etc. And there can be no doubt but what that most inefficient of blast furnace accoutrements, the mammoth blast furnace stoves, are scheduled for early displacement. Such stoves are costly, troublesome and thermally sinful, and that they will eventually give way to the relatively inexpensive, far more compact and efficient metallic recuperator is seemingly a safe assumption, particularly so in view of the excellent results reported on pilot installations throughout Europe.

With the exception of the points just noted, it is of course quite likely that the embryo metallurgist of today will as an old man be dealing with blast furnaces physically not unlike those of today. The furnaces will be required, of course, to handle increasingly leaner ores, drastic purification being performed chemically in the ladle. Excellent groundwork of this nature already has been laid by the installations at Corby, England, and in plants being built or planned to handle the lean ores of Germany. The practices so developed in Europe will greatly ease the shift from currently rich ores of today to the lean and more widely scattered ores that the United States may be forced to utilize tomorrow.

The open hearth has the appearance of less longevity than the blast furnace. Admittedly the open hearth is a reliable piece of equipment in skilled hands today, being quite dependable, flexible and versatile. But the open hearth is slow and thermally wasteful. Slag-metal reactions which take hours in the open hearth have experimentally been shown as being extremely speedy, requiring only a few seconds or minutes under proper conditions. Moreover, slag floating on the steel performs far too readily as an insulator rather than a conductor, and for the latter reason far too much of the heat supplied to the furnace finds its way up the stack. A rapid refining method, such as that devised and used with considerable success in France by Perrin, economically and theoretically has far more in its favor. Iron is quickly

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THE mural by Francis Scott Bradford in a niche on the Consumers Building at the New York World's Fair depicts the desire of man to control and direct Nature. The figure of an electrician, done in green, dominates the composition, which is 50 ft. long by 30 ft. high. Rubber base paint is used.

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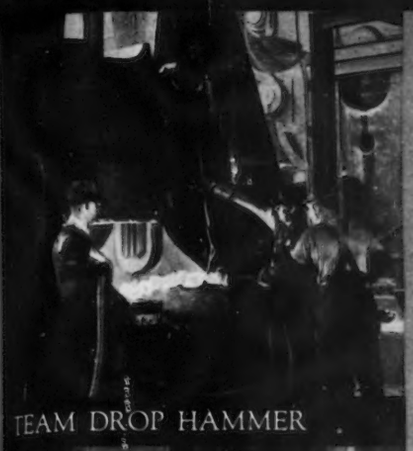

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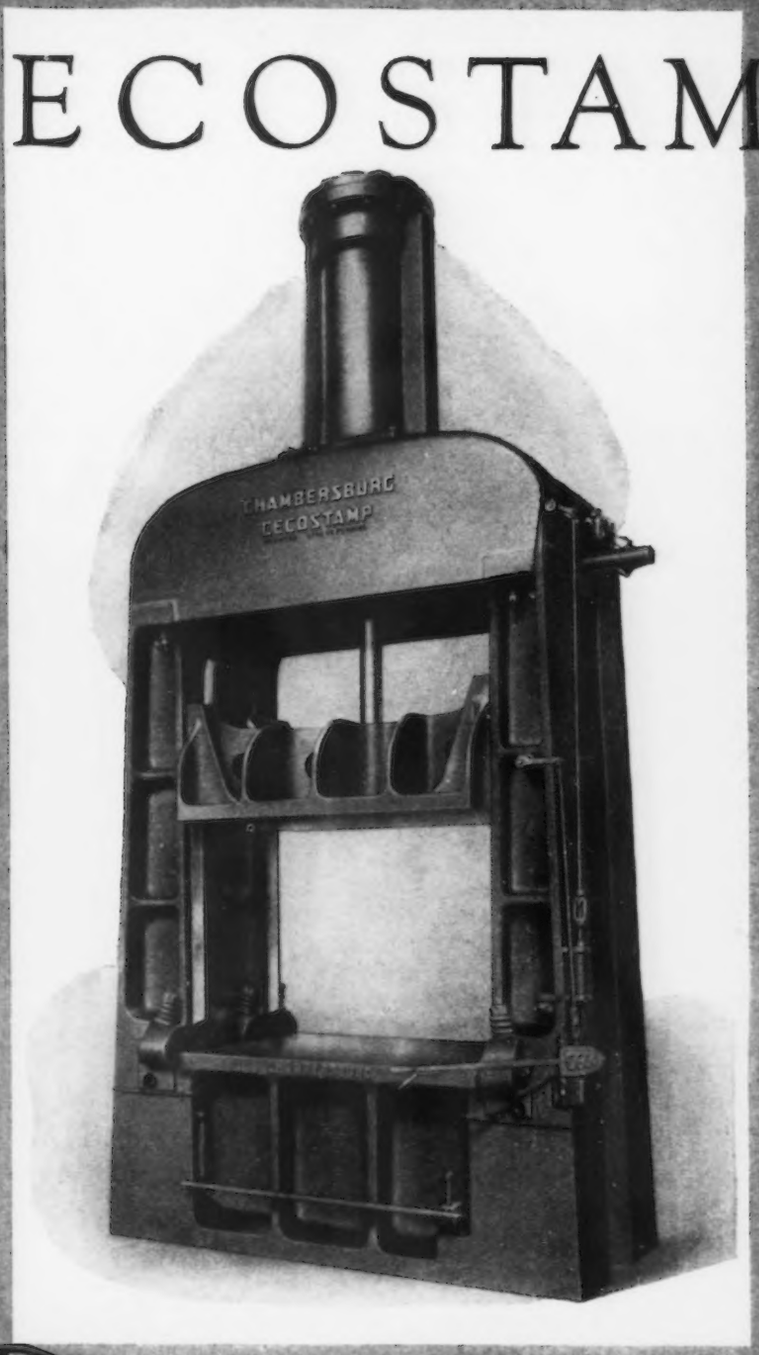

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blown in a basic converter, later to be rapidly dephosphorized and deoxidized by pouring it into a ladle containing a slag which had been melted separately in an electric furnace. The speed of removal of phosphorus, silicon, etc., by this method is strikingly fast, in the order of a few minutes, there is little waste energy in the method and results are surprisingly controllable despite the fact that the method is commercially an infant. Already high grade steels such as tool types have been so produced. As regards the third phase of steel making, the ingot, about the best that can be credited to this step is that it is a metallurgical monstrosity, being about as unscientific a step as is possible between molten steel and the finished steel. The onus of interior defects and lack of homogeneity must be laid to the ingot. There is a direct monetary loss in the large dissipation of thermal energy, and less than two-thirds of the ingot is available for the production of finished steel, the remainder being routed through the mill as scrap material.

The ingot phase has been slicked up a little through the efforts of clever metallurgists and careful consideration of a number of minor variables. Even so, the ingot phase is always most likely to remain a curse unless totally obliterated by a radical departure from present practice. Such a departure has been envisaged by innumerable inventors in carrying the steel from the molten phase direct to some form of semi-finished steel, the equipment for such transference being of comparatively simple and fool-proof design and of low cost.

The Hazlett method of rolling direct to continuous thin plate has to the author's mind shown considerable success in the non-ferrous metals. Even though current usage is rather spotty, there is a persistent feeling that a comparatively minute amount of work and money has shown such dramatic results that expenditures even remotely equivalent to the potential results of such a practice would be unquestionably successful. The Hazlett method for steel has in no instance been given a decent large-scale attack. Work needs to be done on gases in steel, segregation and structure during rapid cooling, for all these problems are pertinent to the direct rolling of steel. As to the mechanical difficulties, such as gage variation, edge ruggedness and checking of rolls, all these have pretty well been attacked by Mr. Hazlett in recent efforts to perfect a sharp departure from methods previously tried. In a full-size experimental machine set up for steel, employing several entirely new principles, the steel passes through the machine at much higher speed, with great gage uniformity, a clean edge, and, most important, a possible problem in roll checking has been entirely minimized. A variation of the Hazlett method for the production of tubing direct from molten metals, including steel, which likewise has been operating some time experimentally, also offers considerable promise.

If not the Hazlett method, it is possible that the ingot phase and slab mill can be hurdled by the Williams or allied method, that of continuously pouring a heat of steel through a slab mold to emerge at the other end in a shape suitable for immediate handling by the hot mills. Even though the Williams procedure has not been attended by worthwhile success, as far as the author knows, mention must be made of an ingenious variation of the same general method developed by Goss. Using a hand welded, and rather crude, mold, in part of water cooled copper, and equipped overall with internal lubrication, Goss has even with four or five initial trials turned out plain steel and alloy slabs of remarkable surface smoothness and rather odd, albeit very desirable, internal structure.

THIS mural panel by James Owen Mahoney over an entrance of the Communications Building at the New York World's Fair dramatizes the theme of printing. Executed in rubber base paint, the color scheme is yellow and white, accented by reds and blues. The mural is 17 ft. wide by 25 ft. high.

Irrespective of the substitute practice finally developed, there is every reason to believe that the ingot phase, blooming or slab mills will eventually go by the board. As now constituted this step in steel making is neither technically nor economically justified, and will start to suffer just as soon as so much money is spent in developing a substitute procedure as has been spent in, say, the futile search for a method of direct ore reduction, or in the perfection of the continuous mill.

As regards the fourth phase of steel production, the rolling, there is today little to indicate a radical change over and above that reaching a current conclusion other than what may mature as the result of changes in the third phase. It is likely that continuous mill speeds will increase moderately, or roll housings and screw-downs made more sturdy to handle greater amounts of alloy steels, or the number of roll stands reduced as the result of heavier drafts during rolling. Otherwise, the average appearance of the rolling department will likely remain familiar. The Steckel reversing type mill will probably become increasingly popular as a handler of job lots of steel, particularly wide and thin alloy stripsheet, and some mills may find it profitable to use quite wide cluster type mills for turning out thin sheet, for the most part in alloy grades. It's also likely that the Steckel hot mill will be adopted more freely in the future particularly by those smaller mills with limited resources and handling a volume of small lot orders. Surface characteristics of Steckel hot rolled strip and general operating technique, have both undergone progressive improvement in two United States mills and one German mill.

One annoying characteristic of continuous hot or cold rolling is the marking of rolls, or the need for fairly frequent changes due to wear. This will lead to the development of better rolls. In fact, a cemented carbide roll has already been used in Steckel mills, there being rolls of over 30 in. in length perfected after many years of experimentation. These rolls are extremely hard and have displayed remarkable resistance to marking and wear, and in actual performance have outlasted tool steel rolls that the finished steel has an "as rolled" surface that is well nigh perfection itself.

Tin Plate Threatened

The treatment of steel, that is any secondary manufacturing treatment al-

(CONTINUED ON PAGE 180)

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STEEL PLANS *its* FUTURE REALISTICALLY

INCREASED steel production and finishing at a lower unit cost with no sacrifice in quality will be the steel industry's formula during 1939.

Adherence to this policy is being forced on the industry because of high wage rates, comparatively low selling prices, and heavy and increasing taxes. Accentuating these conditions is the tremendous steel capacity, provided to meet peak demands, which makes it imperative for all steel companies to remain strictly competitive if they are to continue in business.

Ever present is the likelihood of fundamental changes in consumer requirements which, in the past, have necessitated costly experiments and installations by steel companies in an effort to further the use and application of steel products.

Faced with these problems, the steel industry finds wage rates practically inflexible, owing to union and political pressure. Taxes, already an important production cost, will be increased. Steel prices are continually subject to political and economic pressure. Even though prices may be increased during the coming year, the advances will not be large. Whether the steel industry likes it or not, it has become committed, at least partially, to a

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By T. C. CAMPBELL
Pittsburgh Resident Editor, THE IRON AGE

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"large volume-lower price" policy, especially where flat rolled products are concerned. If this statement is doubted, it should be remembered that large consumers were able to get substantial tonnages of sheets and strip in mill books during the "bargain days" in October, 1938, when the going price on these items was at least $6 below the published price.

Where, then, is the "out" for the steel industry? With no important management control over wages, taxes, and prices, there is only one major avenue open. Steel must turn to the more economic *production* of steel products to find the answer stockholders and boards of directors are anxiously awaiting. This phase of the steel business must and will receive major attention from production, engineering, and sales departments during the current year.

Replacement or modernization programs must prove themselves in terms of lower unit costs or additional markets, to justify putting them into execution. Equipment and manufacturing layout are not the only fields being scrutinized by steel companies. Long established steel making practice will be revamped or discarded if sound analysis discloses opportunities to increase production and quality.

Duplex Steel Making to Expand

One fundamental step to be taken in the future by at least two major steel companies is the extensive installation of duplexing facilities in present open-hearth steel departments. This move offers a fertile field for ultimate unit cost reduction. Whether this occurs in 1939 is not important—it will take place when increased business warrants the change.

Briefly, duplex steel making consists of blowing out carbon, manganese and silicon from molten iron in a bessemer converter and transferring the residual metal to the open hearth for refining. The major justification for the duplex method is its independence of scrap. Another advantage is the speed with which a heat of steel is finished. About four to six hours is consumed by duplexing as against 10 to 15 hours for a normal heat made by the pig

Approximate Annual Capacity—Cold and Hot Reduced Tin Mill Products by Companies in Net Tons

Company	Cold Mill Capacity	Cold Mill Per Cent of Total	Hot Mill Capacity	Hot Mill Per Cent of Total	Total
U. S. Steel Corp.	650,000	41	950,000	59	1,600,000
National Steel Corp.	420,000	93	30,000	7	450,000
Bethlehem Steel Co.	291,000	54	246,000	46	537,000
Wheeling Steel Corp.	240,000	100	None	—	240,000
Youngstown Sheet & Tube Co.	200,000*	100	None	—	200,000
Republic Steel Corp.	193,000	58	140,000	42	333,000
Inland Steel Co.	157,000	100	None	—	157,000
Jones & Laughlin Steel Corp.	121,000	47	134,000	53	255,000
Granite City Steel Co.	80,000	70	35,000	30	115,000
Follansbee Brothers Co.	16,000	20	65,000	80	81,000
McKeesport Tin Plate Co.	None	—	202,000	100	202,000
Continental Can Co.	None	—	130,000	100	130,000
Washington Tin Plate Co.	None	—	31,500	100	31,500
	2,368,000	55	1,963,500	45	4,331,500

*At present cold capacity is 168,000 net tons. Improvements now under way to make estimated 200,000 some time in 1939.

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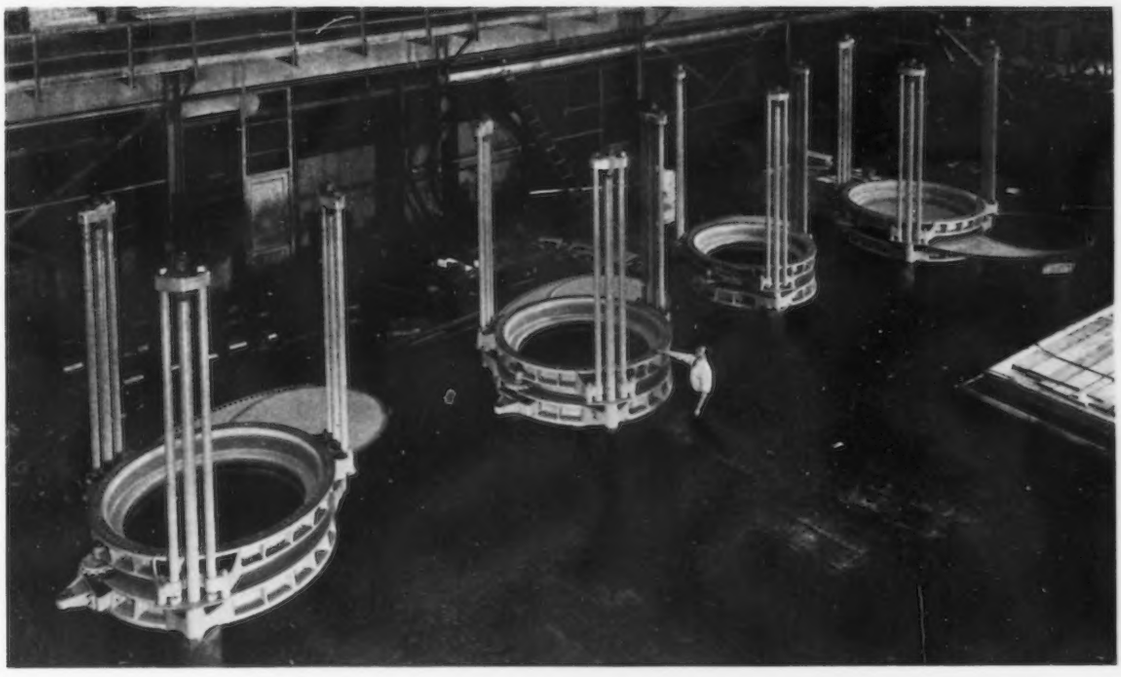

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CONTINUOUS HOT SHEET AND WIDE STRIP MILLS IN THE UNITED STATES WITH REVISED ANNUAL CAPACITIES

Company and Location of Mill	Construction Started	Size In.	Annual Capacity in Gross Tons	Per Cent of Country Total
PITTSBURGH DISTRICT				
*American Rolling Mill Co., Butler, Pa.	1926	48	450,000	
Allegheny-Ludlum Steel Corp., Brackenridge, Pa.	1932	36	275,000	
**Carnegie-Illinois Steel Corp., Homestead, Pa.	1936	100	720,000	
Jones & Laughlin Steel Corp., Pittsburgh	1936	96	720,000	
*Carnegie-Illinois Steel Corp., near Clairton, Pa.	1937	80	640,000	
District Total			2,805,000	18
WHEELING-WEIRTON DISTRICT				
*Weirton Steel Co., Weirton, W. Va.	1927	54	643,000	
*Wheeling Steel Corp., Steubenville, Ohio	1929	60	840,000	
District Total			1,483,000	9½
VALLEYS (YOUNGSTOWN & VICINITY)				
*Republic Steel Corp., Warren, Ohio	1927	42	388,000	
*Youngstown Sheet & Tube Co., Campbell, Ohio	1935	79	750,000	
*Carnegie-Illinois Steel Corp., McDonald, Ohio	1935	43	420,000	
District Total			1,558,000	10
CLEVELAND DISTRICT				
Otis Steel Co., Cleveland	1932	77	375,000	
*Republic Steel Corp., Cleveland	1937	98	804,000	
District Total			1,179,000	7½
DETROIT DISTRICT				
*Great Lakes Steel Corp., Ecorse, Mich.	1930	38	535,000	
*Ford Motor Co., Detroit	1935	66	351,000	
*Great Lakes Steel Corp., Ecorse, Mich.	1936	97	840,000	
District Total			1,726,000	11
CHICAGO DISTRICT				
*Carnegie-Illinois Steel Corp., Gary, Ind.	1928	42	440,000	
**Carnegie-Illinois Steel Corp., South Chicago, Ill.	1931	96	720,000	
*Inland Steel Co., Indiana Harbor, Ind.	1932	79	800,000	
*Youngstown Sheet & Tube Co., Indiana Harbor, Ind. (Reversing Mill)	1934	72	225,000	
*Carnegie-Illinois Steel Corp., Gary, Ind.	1935	38	291,000	
*Carnegie-Illinois Steel Corp., Gary, Ind.	1936	80	640,000	
Inland Steel Co., Indiana Harbor, Ind.	1937	47	500,000	
District Total			3,616,000	23
OHIO RIVER DISTRICT				
American Rolling Mill Co., Ashland, Ky.	1926	58	432,000	
*American Rolling Mill Co., Middletown, Ohio	1929	80	605,000	
District Total			1,037,000	6½
BUFFALO DISTRICT				
*Bethlehem Steel Co., Lackawanna, N. Y.	1936	79	720,000	
District Total			720,000	4½
ST. LOUIS DISTRICT				
*Granite City Steel Co., Granite City, Ill.	1936	90	420,000	
District Total			420,000	2½
PHILADELPHIA DISTRICT				
Bethlehem Steel Corp., Sparrows Point, Md.	1937	56	600,000	
District Total			600,000	4
SOUTHERN DISTRICT				
*Tennessee Coal, Iron & Railroad Co., Birmingham, Ala.	1937	48	450,000	
District Total			450,000	3
GRAND TOTAL			15,594,000	100

*Revised Capacity.
**These mills are continuous and semi-continuous plate mills but are capable of rolling heavier gage sheets.
Note—Revised capacity figures in most cases are identical with those reported recently by the American Iron and Steel Institute.

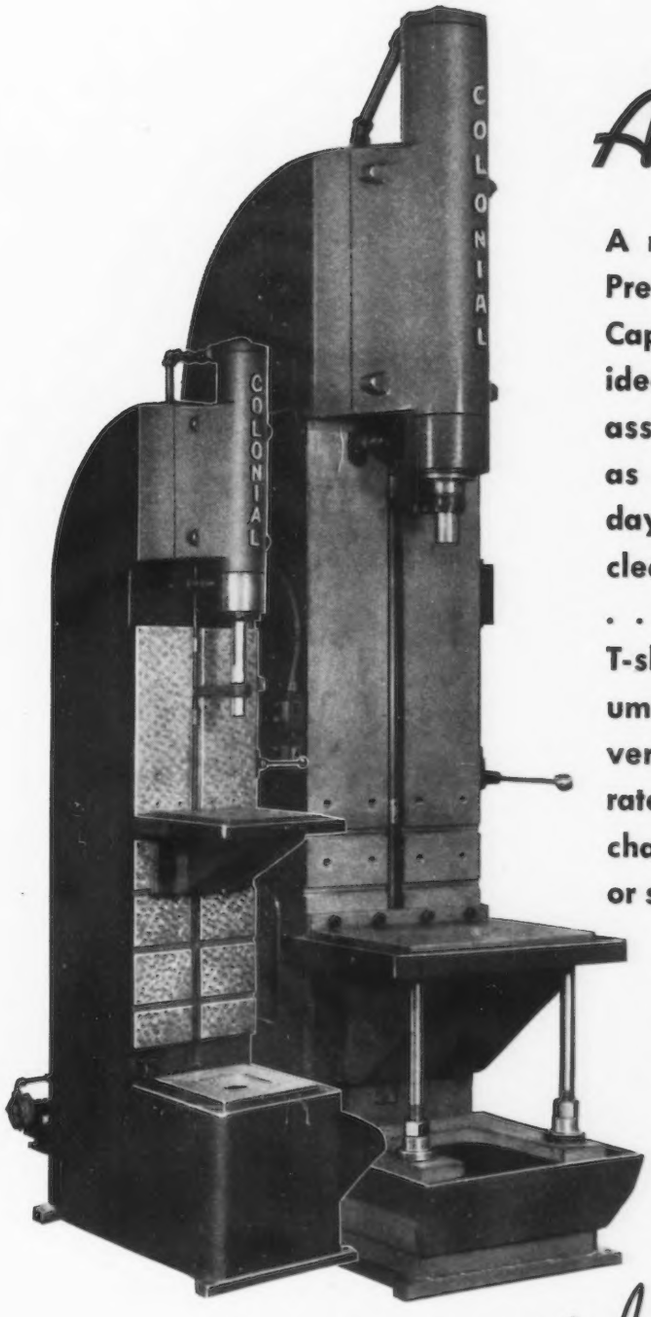
iron and scrap methods. A proper relationship between duplexing and scrap steel-making equipment allows periodic accumulation of steel scrap to be utilized when the pig and scrap method predominates. One method supplements the other, depending on the supply or price of scrap.

Some steel companies have questioned the advisability of being vulnerable to wide swings in the price of scrap. This has been one raw commodity over which the industry has had little control. Nor can they plan costs ahead as market conditions frequently have resulted in a rapid price increase.

When some companies complete arrangements for modern duplexing equipment and practice, they will be able, during times of high scrap prices, to resort to duplex steel making more extensively. When the price of scrap sags, the carrying cost of bessemer converters will be the only unproductive expense, as mills step up production by pig iron and scrap practice. A prerequisite for such a fundamental change in steel making is, of course, the availability of substantial ore reserves and blast furnace capacity.

While cost "on paper" at times may seem high in production of duplex steel, the carrying charges on ore properties and primary producing units continue, regardless of utilization. Steel companies are more interested today in "out of pocket" cost than they are in paper cost. This is so much truer that for the past few years some steel companies have manufactured steel scrap synthetically in lieu of open market buying. Volumes upward of 60,000 tons have been made in a comparatively short period, and at present it is the regular practice at some plants to "make" scrap. Iron is blown in the bessemer converter and the residual cast into small ingots, to be later charged into the open hearth. With the supplement of duplex steel making practice, manufacture of synthetic scrap becomes, of course, unnecessary except for purposes of temporary balancing.

In addition to removing some of the variables in steel making costs due to scrap prices, duplexing methods will also greatly increase the flexibility of steel ingot capacity. A company which has a given number of open hearth furnaces and using pig and scrap methods, could, under certain circumstances, nearly double actual output by installation of proper duplexing equipment. The results are gained, of course, by the speed with which hot metal is prepared by the bessemer



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converter for duplexing. Such an advantage is realized to the fullest extent during peak periods of demand.

The possibilities for increased production of steel at lower cost in addition to further improving quality will continue to rank as the industry's number one problem for some time to come. While some companies may take different routes to the solution, the aims will be identical. Currently, considerable experimenting is going on to determine how great a percentage of iron may be safely used in a heat of steel made by pig-scrap methods. Ordinarily, 40 per cent iron and 60 per cent scrap make up the charge. One company, however, has successfully used 70 to 75 per cent iron. This method is but another way to become less dependent on scrap in a rising market.

THE mural panel by Pierre Bourdelle on Food Building No. 2 at the New York World's Fair shows the figure of a reaper at work. The technique used is a mixture of sgrafitto and fresco on cement. The mural is 22 ft. wide by 27 ft. high.

o o o

Finishing Operations to be Modernized Further

The next step from steel making in the cost reduction drive takes in the blooming mill. Modernization of roughing capacities has not kept pace with the increase in flat rolled finishing capacity. Several roughing mills have been installed recently, but in order to complete the unbroken line in quality and tonnage production further installation of blooming and slabbing mills is expected in 1939. Strong competition in the industry practically dictates that what one mill does the other must duplicate.

Perhaps more important than roughing mill replacement will be the further modernization of recently installed equipment, with emphasis on the economy, quality and capacity of ingot heating facilities. Increased labor costs, coupled with greater speed in production, is forcing thought on complete automatic control of blooming operation. Capacity can be increased if the rolling program is standardized. Some mills are working on this problem, which may find regular slabbing mills operating on the same principle of automatic pass setting as now employed in some of the larger structural and plate mills.

Designers of roughing mills are constantly attempting to aid steel companies by building mills in such a way that steel companies can adopt more uniformity on ingot sizes. To some extent, this has already been done and further work along these lines is expected.

Speed, performance, and production of continuous hot wide strip mills have been developed phenomenally since the first installation in 1926. Delivery speeds now approximate 2100 f.p.m. Although nominal capacities of the larger mills are rated at from 600,000 to 800,000 tons a year, comparatively slight overall changes could easily raise this to 1,000,000 tons annually. With hot mills in good economic balance with respect to production and unit cost, the industry will continue to focus attention on finishing equipment and cold mill departments.

The ultimate goal is to have cold mill production simulate the hot mill in speed and tonnage. Recent modernization on cold reducing mills has made possible a speed of 1500 f.p.m. or more. However, even though this production is possible, the cycle is still held back due to slow-ups resulting from accessory equipment, handling, etc.

Greatest chance for increasing cold strip production lies in further utilization and development of welding equipment for coils. The larger the coil, the greater the productivity of the cold mill. Large coils are being produced at present by welding ahead of the pickling line. Current thinking, however, among steel officials and equipment engineers, leans toward strip welding immediately ahead of the cold mill. A concrete realization of this thought (it is now out of the theory stage) will result in what could justifiably be called continuous cold rolling of strip.

The most recent developments on welding equipment for strip coils involve electric flash welding, proper trimming, and annealing and rolling of the welded zone. Cycles of one and a half minutes have been obtained and it has become unnecessary to shear out the weld since chance of injury to cold mill rolls has been eliminated.

In addition to these probable changes and refinements, mill and equipment engineers are continually at work on gears, motors, handling equipment and auxiliary equipment speeds in order to enable the steel industry to increase production. Considerable attention is being given shearing lines where speeds of 500 f.p.m. have been obtained on tin plate shearing. All of these projects, however, can be simply interpreted as fitting into the major plan of increasing production with lower unit costs but with better quality.

Industry Physically Able to Fulfill Demands

Despite tremendous internal problems within the steel industry, it is now physically able to take care of practically any demand to be placed upon it. Steel making and finishing equipment is generally in better shape today than has ever been the case. Millions are being spent annually for research and in an endeavor to make not only better steel but to find new outlets.

It is not amiss at this point to indicate that the steel industry has footed the bill for much of the development in consumer and capital goods equipment. Enormous investment has been necessary to bring the industry to its present stage.

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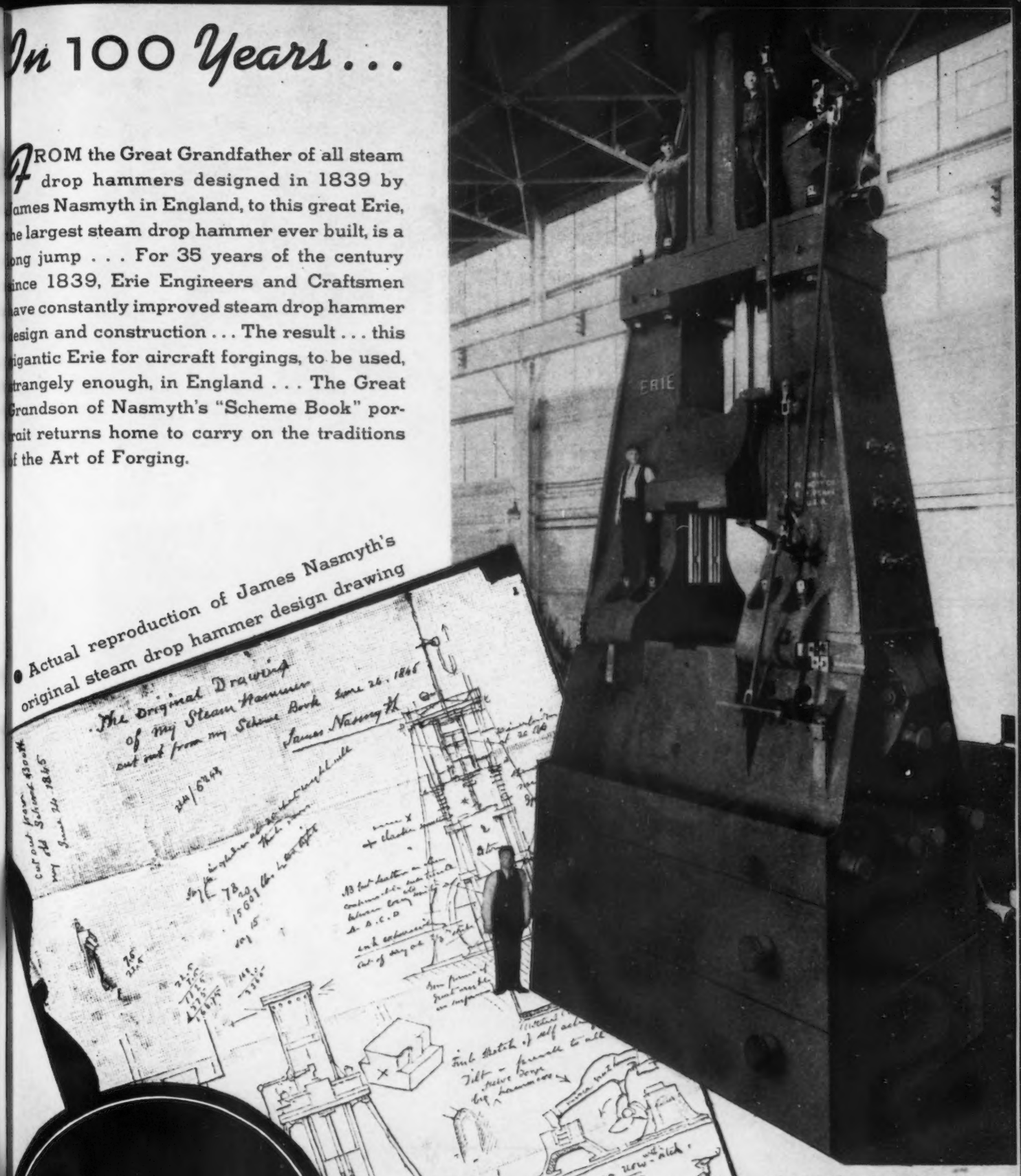

● Actual reproduction of James Nasmyth's original steam drop hammer design drawing

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ERIE BUILDS *Dependable* HAMMERS

PUTTING MORE *and* BETTER POWER *into* 1939

By FRANCIS JURASCHEK
Consulting Editor

o o o

COMPETENT authorities have estimated that American industry spends $2,000,000,000 every year for power. The cost of this power as applied to work averages about 10 per cent of the total cost of manufacturing; being as low as two to three per cent of the total in some industries, such as builders hardware, while in others, as in the making of paper, it may be as high as 40 per cent or more.

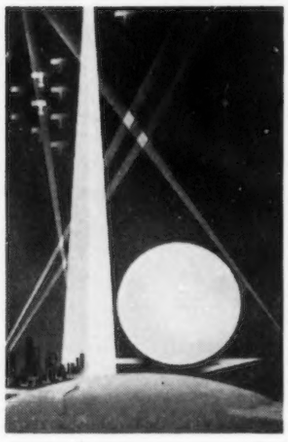
The generation and distribution of power is today, generally speaking, on a plane of high efficiency. It is not unusual to secure a horsepower-hour from a pound of coal, or its fuel equivalent. But the application of the power so economically obtained still lags far behind the efficient marks established for generation and distribution. Throughout industry as a whole, between the meter and the machine, a needless wastage of almost 25 per cent of the total power generated, still exists. Here is a self-imposed tax of $500,000,000 a year which industry is constantly paying out, and for which absolutely no return is being received.

The larger the plant the smaller is this percentage of waste, for in the large plant the cost of power is more evident, and bad conditions are quickly noticed and corrected. It is in the medium and small size plants of the country, and particularly in the older plants of these classes, that power wastes are highest; but these are the very plants which can least afford such wastes. In all plants, however, whether large or small, there are still many ways in which power is wasted; and few indeed are the number in which power may be said to be applied really economically and efficiently. All, without exception, can still effect further economies here.

Where Are These Wastes?

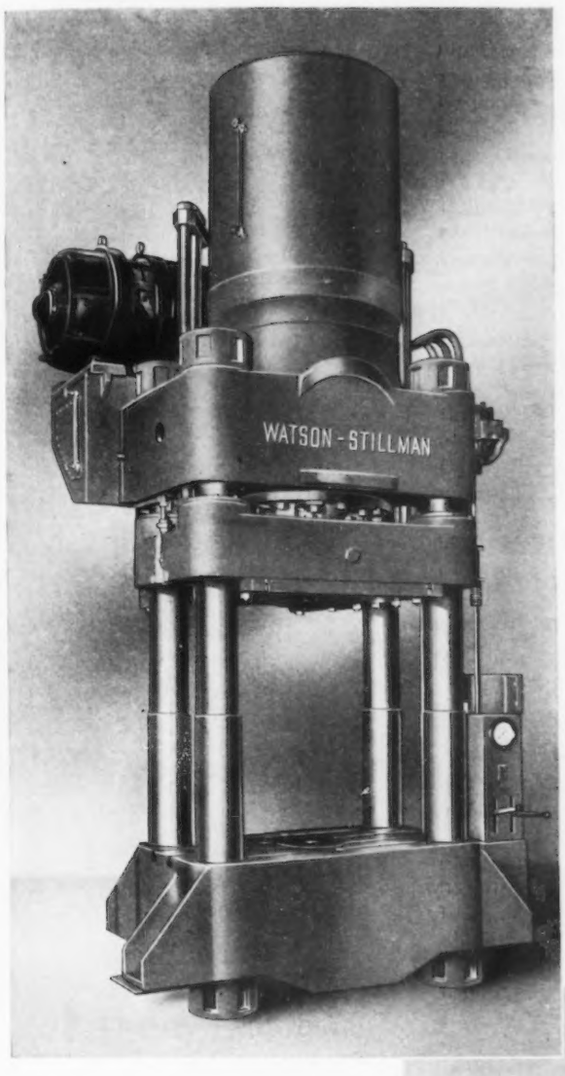
Friction has long been counted man's worst enemy in the use of power. It still is, but running neck and neck with friction are other elements not so easily discoverable and therefore not so readily overcome. Low power factor and high demand are insidious evils attending the use of electric power, and excessive maintenance charges on power transmission and application equipment may not actually *waste* power, but they certainly add to its cost unwarrantably.

Assuming that the use of power for plant lighting, for furnaces and ovens, and for welding work amounts to about eight per cent of the total industrial consumption, it is evident that the big problem of power application is concerned with the turning of driven machine shafts. In brief, it centers around the transfer of energy from one rotating shaft (as in a motor or an engine) to another rotating shaft (in the driven machine).



INDUSTRY'S two billion dollar annual bill for power represents approximately 10 per cent of the total cost of production. Almost one-quarter of that power is still being needlessly wasted. What can be done in 1939 to eliminate that wastage?

Whatever the driving source may be, to get that energy to the driven shaft requires some form of transmission equipment. From the motor or engine to the machine driven shaft there are possibilities of waste in couplings, gears or chains, in belts and lineshafting, hydraulic or pneumatic drives. But from the meter to the motor there are likewise possibilities of power waste in wiring, in control equipment, and in the motors themselves. Some of these wastes are inherent in the types of equipment used, some are the result of improper appli-



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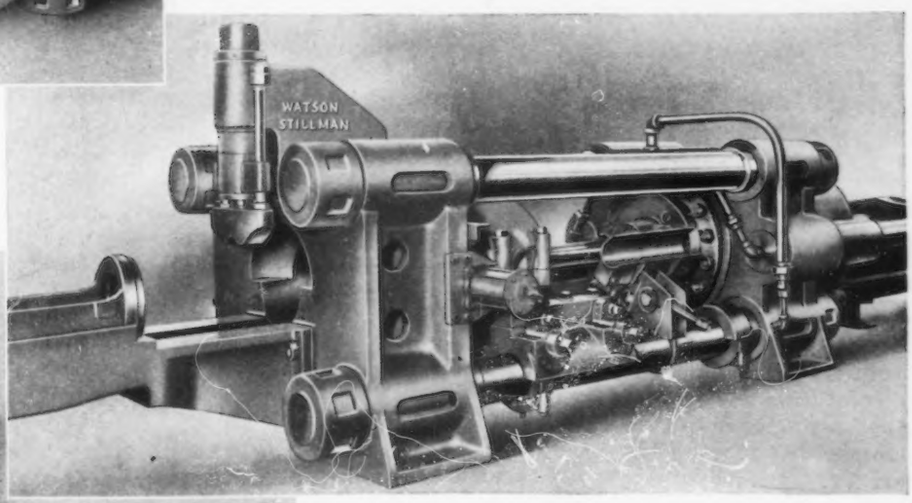
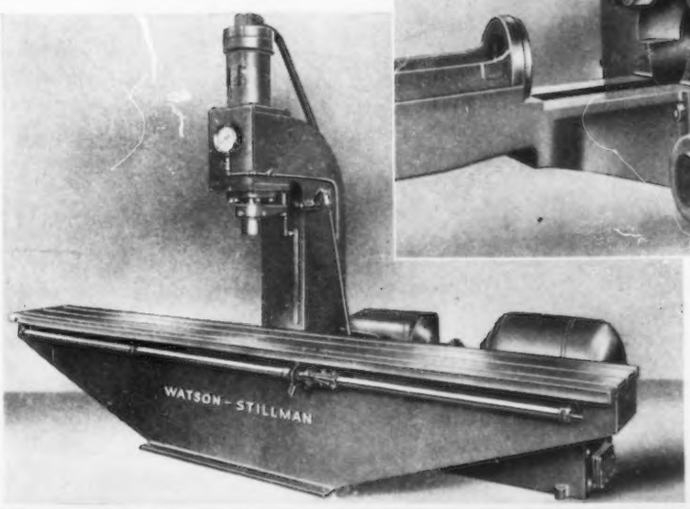


Solid bars and shapes of aluminum, brass and other non-ferrous metals are extruded on this 1000-Ton Horizontal Extrusion Press.



This 75-Ton Rapid Acting Straightening Press greatly simplifies straightening operations.

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cation of that equipment, and some are the outcome of a poorly planned system of power distribution and use within the plant.

Finding the Wastes

Only in recent years has the true importance of these various wastes given rise to a widespread and determined attempt to root them out and rectify them. A new technique has lately come into being—fostered largely by the invention of the graphic recording meter. Today, the *plant survey for the determination of power wastes* is an acknowledged and accepted practice in the progressive plants of American industry. A natural outgrowth of the pioneer work of Frederick Taylor in the field of time-motion study, this plant survey technique takes nothing for granted, but begins at the power source and mercilessly analyzes every foot-pound of energy used throughout the entire plant, from the twin standpoints of efficiency and economy. The results of these analyses, translated into terms, not of kilowatt-hours wasted, but of dollars lost, form the first logical step in the rehabilitation of the use of power on a profitable basis.

In 1939 we shall see a more widespread use of this plant survey technique to determine the wastage of power, and as a direct result, we shall also see a more intelligent use of power transmission equipment of all kinds for the purpose of reducing the costs of production.

Management is realizing more and more that it cannot afford to throw away a half-billion dollars, or close to two and a half per cent of its entire cost of production, without any return. Whatever the price may be that must be paid to eliminate this wastage, it will be paid; for this is one of the very few elements of the cost of manufacturing which still remains within the control of management. That price *must* be paid eventually; the choice lies between paying it willy-nilly in a continuance of the wastes, or in paying it for the means of correcting them, and of amortizing the costs out of the savings effected.

Eliminating the Wastes

Fortunately this latter proposition is essentially sound. And, even more fortunately, the price that must be paid in the great majority of cases is so quickly offset by the savings effected that the amortization of the cost is not a long-term operation. For, the savings that result from the intelligent application of power in the average industrial plant are not limited to the elimination of the obvious wastes of power now existing, but are reflected in a score of incidental yet no less real production economies elsewhere.

Intelligently planned and properly installed power transmission in the manufacturing plant must be considered not alone from the standpoint of the operating cost of the power delivered to the work, but also from the standpoints of the investment cost of the equipment required to accomplish that delivery, of the cost of maintaining that equipment during its normal life-period in a state of reasonable efficiency, and of the effect upon the output of the driven machines as part of the general scheme of production.

Management is interested today and will be even more vitally interested in 1939 in six basic economic factors of the use of power transmission methods and equipment:

1—Maximum production at minimum power cost.
2—An efficient, uninterrupted flow of production.
3—The attainment of maximum motion-economy in production.
4—Maintenance costs reduced to the bone.
5—Minimum long-term investment in equipment.
6—The use of the least possible amount of power for the work to be done.

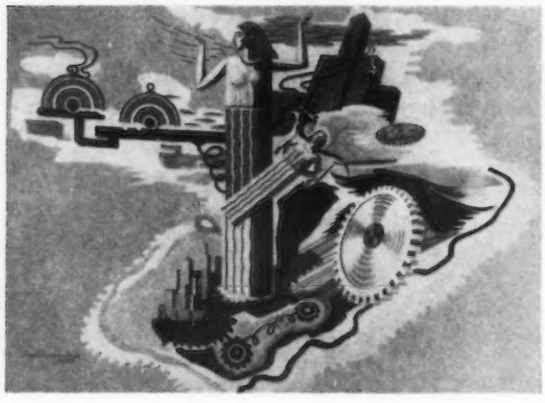
In a day when power was cheap and its volume of use relatively small, we could afford to waste it with a lavish hand. Today, paradoxically, it costs less to make a unit of power, but the use of these units has become so large that, cheap as power may be to make, we can no longer afford to waste a single B.t.u. needlessly. The more miserly we can become in using power, the more nearly are we able to make a decent profit on our manufacturing operations.

To discover this fact we needed instruments. And with instruments we are enabled to make the plant survey for the determination of power wastes which sets us upon the road to *saving* power instead of wasting it. With instruments the new technique of the plant survey will enable the manufacturer in the World of Tomorrow that is beginning in 1939, to lop off at its roots the half-billion dollars of annual power waste that is today one of the most costly of the still controllable excrescences on the body of American industry.

How Will This Be Done?

In the very large industrial plants of the country these facts are being recognized, and expert power application engineers (regardless of whatever title they may have) are applying analytical methods to determine and correct excessive power costs. In smaller plants such experts cannot always be employed full time, but production and maintenance engineers are rapidly learning the new technique and using the instruments now available from a dozen sources. In still other plants there is always the possibility and advisability of having such analytical work done by outside consultants when there is no one among the employed personnel possessing sufficient knowledge and experience to do it competently.

But, advisable as it may be in the long run to employ experts to do this work, it is not necessary for any management executive who entertains any



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THE mural by Francis Scott Bradford on the Consumers Building at the New York World's Fair is an abstract design depicting "Production Over Manhattan." Executed in rubber base paint, the composition is 30 ft. long by 25 ft. high.

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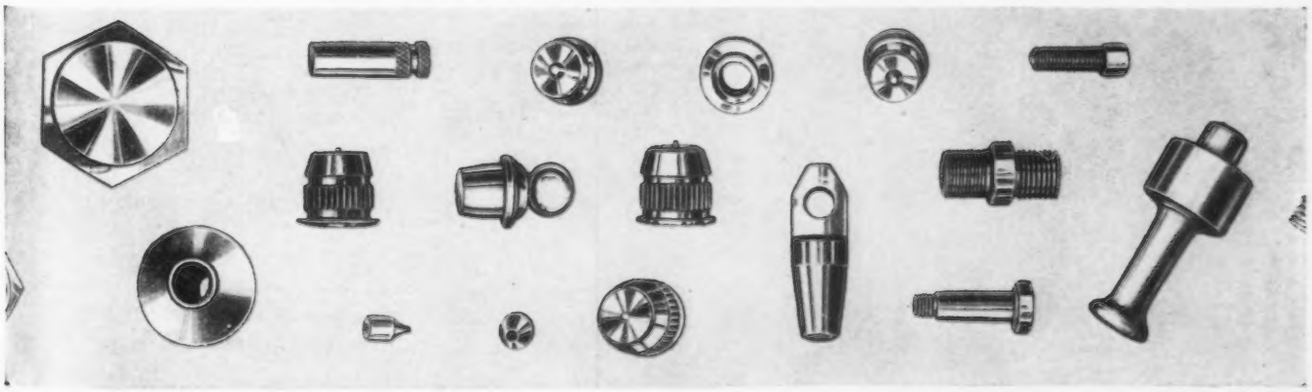

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THE mural by Hildreth Meiere on the Medicine and Public Health Building at the New York World's Fair is executed in Keim color technique with poster-like effectiveness. Its dominant figure is a doctor, who points out to ailing humanity the resources of modern science. The size of the mural is 34 ft. wide by 36 ft. high.

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doubts on the subject, to do so. He may secure the few instruments needed and test his own equipment piece by piece, and make the changes indicated bit by bit, as circumstances warrant and as results prove the wisdom thereof. There are no deep mysteries involved. Anyone with the fundamentals of an engineering education or its equivalent in practical engineering experience may readily learn how to use these instruments and how to determine the logical answers to his own power application problems. A little experience of this kind will usually convince him of the profitable possibilities which lie in the employment of an expert to make a complete plant survey, but meanwhile he will have tasted the first fruits of his savings and have found them very sweet.

This sort of thing is happening every day, throughout all the length and breadth of American industry. It is the sort of thing that makes it possible to predict without fear of contradiction that the coming year will witness a more intelligent, a more efficient and a more economical putting of power to *work* than anything we have seen in the past.

The More Efficient Use of Power

Of necessity, all types of power generating equipment deliver energy in relatively large blocks, while manufacturing requirements consist for the most part of relatively small loads. The transmission and application problem, then, is concerned with the efficient and economical distribution of large blocks of energy over a number of small loads, and not merely with the application of some particular 5 or 15 hp. to a given piece of driven equipment. Hence the transmission problem rightfully begins a great deal further back than is normally supposed; actually it must be considered to start at the point where power enters the manufacturing end of the plant, whether it is purchased from an outside source, or actually made right in the plant in question.

Power application is therefore a much bigger subject than the consideration of a motor, a belt, a reduction gear or a means of control. These are merely a few of the elements of the overall problem. And it is because of this fact that we have had to wait for the development of graphic measuring instruments before we could really grasp the true significance of all the actual elements involved; before we could get away from the commonly accepted meaning of *power transmission* to the broader implications of *power application.*

For, manifestly, cost-factors are not to be determined by any casual inspection of a particular piece of drive equipment. Much which looks rosy on the surface is rotten at the core. And as time-motion studies demonstrated in the case of the human worker, merely looking at an inanimate mechanical servant will give the observer no definite indication of the relation between what it may be doing and what it ought to do.

We must learn to distrust our own eyes and ears and fingers as instruments for measuring the quality and quantity of work performed by our mechanical servants, and put our reliance on instruments far more delicate and far more accurate. Our intelligent use of power has lagged behind the efficiency of our generation of power because we have trusted our physical senses far too much in making power applications, whereas in the power generation field we have learned to use instruments to supplement our physical senses.

But we now have the necessary instruments for power application determinations. In thousands of cases their use has proved immensely profitable to management. As these instruments and their manifold uses become better known, it is but reasonable to expect that power losses in industry will become increasingly less.

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IN gay colors and with charming simplicity, Martha Axley's mural on the front of the Electrical Products Building at the New York World's Fair depicts a theme of "The Means of Industrial Distribution." Done in Keim color technique, the mural measures 28 ft. long by 31 ft. high.

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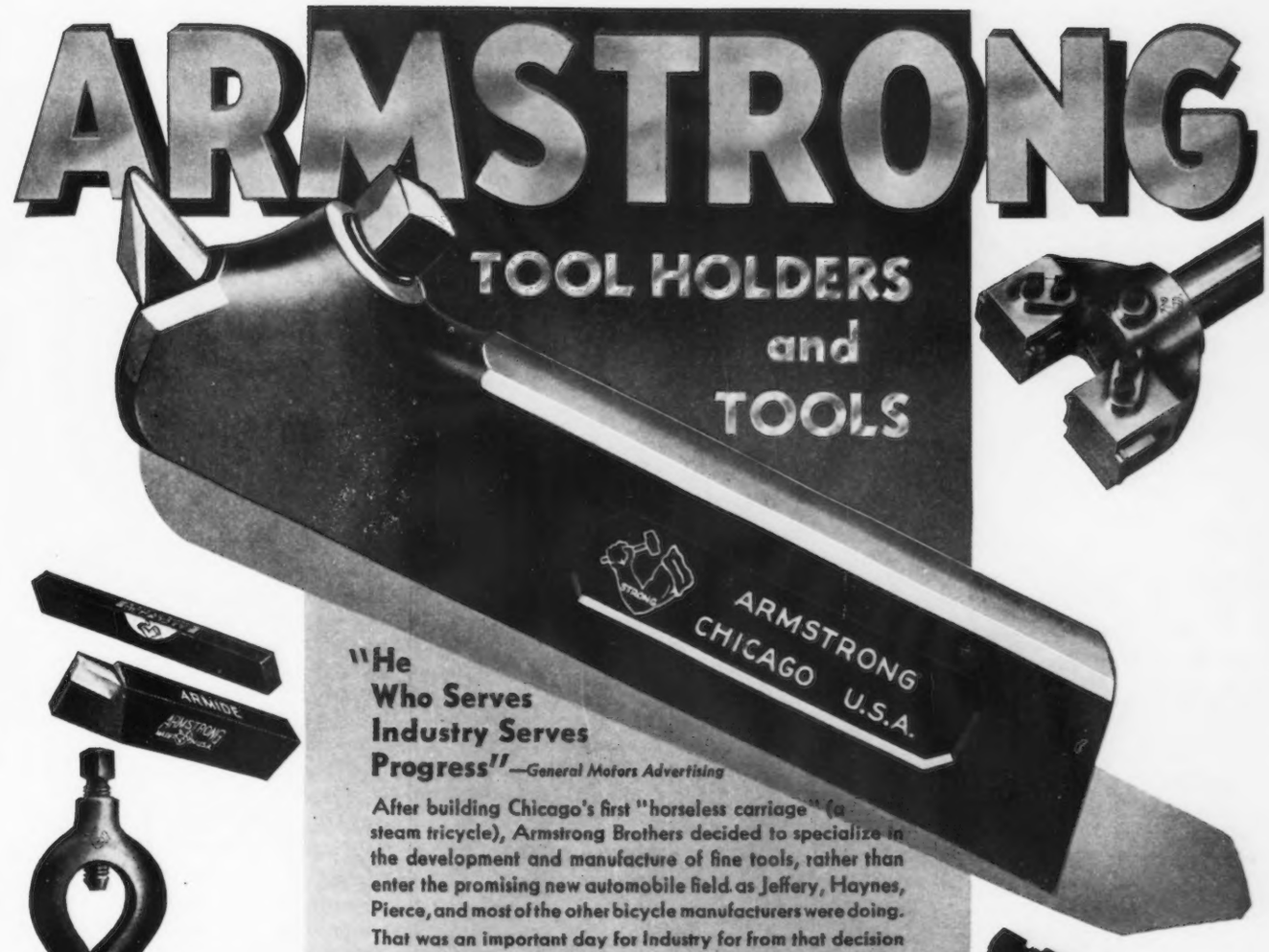
ARMSTRONG

TOOL HOLDERS and TOOLS



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NON-FERROUS PRODUCTS *On the March...*

By ADOLPH BREGMAN
Consulting Engineer

° ° °

THE non-ferrous metals are a heterogenous lot, ranging as they do from the low-priced lead to the high-priced precious metals. Yet, varied as they are, they have one characteristic in common. They represent "quality" in the sense of special materials for special purposes. Although in many cases their first cost seems high, their life, under the severe service demanded of them, is so long that their overall cost is brought into a competitive relation with iron and its alloys.

The future for non-ferrous metals depends to a considerable extent, of course, on general business conditions. Fully as important, however are many special factors which affect each metal. Within the framework of the industry as a whole are movements which indicate the wax of one metal and the wane of another.

In copper there is great activity in improved processes of manufacture; oxygen-free metal; direct manufacture of finished products by electrodeposition; improved welding methods. Lead is coming back in automobile bearings. Zinc will appear in more ductile heavy coatings and more widely as an electrodeposit on iron. Tin holds important promise in tin plate manufacture by continuous hot dipping and by electrodeposition. Nickel continues to filter into a host of fields. Silver has taken a new lease on life in the chemical and electrical industries. Magnesium is becoming a valuable die casting metal. Metal powders are extending their influence in all directions. In the manufacture of non-ferrous metal products, precision and control of processes are forging rapidly ahead, to the great gain of equipment and instruments for these purposes.

These are the conspicuous prospects. Others with their own latent possibilities are presented under each metal, as follows:

Copper

Technical developments in copper and its alloys which hold promise for the coming year are numerous. The Hazelett and Eldred processes for the direct production of sheets, strip and rod from molten metal are among the most important. Oxygen-free copper for severely drawn and formed parts is one of the very interesting "youngsters." It also shows better welded strength and ductility than tough pitch or electrolytic copper base metal. The direct manufacture of sheet screen and other products by electrodeposition is one of the most promising processes on the commercial horizon. Bi-metal products, steel and copper or brass, bonded together are gaining in popularity. The addition of antimony for de-zincification of yellow brasses is receiving some attention. Tellurium and selenium are being considered for addition agents to facilitate machining. Copper containing beryllium has gained a firm place for itself and its growth seems assured, especially if the cost of beryllium comes down. Copper containing such addition agents as chromium, manganese or cadmium are also receiving interested notice. Copper base arficles made from metal powders should have a steadily growing field.

The great consumers of copper are the electrical industries, automobiles and building. The prospects for 1939 are decidedly encouraging for automobiles. The electrical industries, including of course, the public utilities, look more promising today than for several years past, due to the possible compromising of aims of the administration and the utilities. The building industry, while currently still low, has the certainty that the Government housing program will add materially to the consumption of copper in this field.

A prominent development which has every prospect of making rapid strides is the use of copper in small percentages as a constituent of the low alloy, high tensile steels, which are steadily growing in importance.

Bronze welding is increasingly popular for large installations of copper tubes or brass pipe. In connection with the use of 70-30 cupro-nickel sheet, welding is done by the oxy-acetylene torch or the metallic arc. A new electrode for the metallic arc method will be available shortly. This alloy, by the way, is steadily attracting more attention by its good performance in steam condenser tubing and under the corrosive conditions of petroleum refinery service.

Further developments are promised for 1939 in the fusion welding of copper, which is now done frequently with a gas torch, but more frequently with the carbon arc.

Lead

Lead has a hopeful field in lead tetra-ethyl gas, which should make an excellent showing. The present outlets for lead which are showing the most promise for increased consumption are storage batteries (used mainly in automobiles), cable covering for electrical purposes and white lead for

paint. A new lead pigment, a flaked lead, is attracting some attention.

An important new use for lead is in free-cutting steel screw stock which, while it may not consume large tonnages for a time (the percentages are fractional, about 0.2 per cent) opens a very interesting new avenue of consumption.

Automobile engines are said to be returning to lead alloys for bearings; needless to say, a substantial consumer. It has been stated that General Motors used the SAE 14 (75 Pb, 15 Sb, 10 Sn) alloy in 100,000 cars in 1938 and will continue, perhaps on a larger scale in 1939. Even though the tonnage is not yet large (the babbitt lining is thin, 0.02 in. to 0.03 in.) the trend is important.

The consumption of antimony should also benefit by this trend.

The chemical industry seems likely to use much more lead for corrosion-resistant equipment, due to its promising prospects.

Zinc

New fields for zinc which show promise for the coming year include the use of high purity (99.99 per cent) zinc anodes for electrogalvanizing. Considerable research has been done on such operations at low current densities and it is planned to continue this work into the field of higher current densities. Important commercial progress is being made by the producers of galvanized sheets in providing them with heavier zinc coatings that will withstand severe deformation; an improvement that may considerably widen the market for galvanized sheets.

Further developments with excellent futures are described in the sections on Die Casting, and Electrocoating.

Tin

Tin has developed several interesting possibilities. Work has been done on new alloys, including silver-tin and nickel-tin. In the 70-30 nickel-copper composition, tin additions have been made, rendering the alloy subject to precipitation hardening, giving it a wider scope of usefulness. Tin coating of metals from the vapor phase ("stannizing") seems to have some advantages over other coating methods in producing thin coatings of tin alloys for irregular surfaces and for producing very hard or unusual alloy coatings.

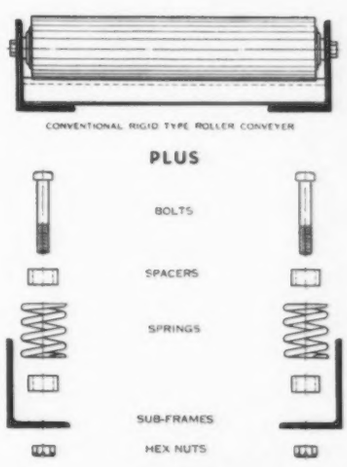
Solder composed of 95 tin, 5 antimony has been used to seal the riveted joints in a large copper tank for collecting the hot mash in a brewery.

MATHEWS
SPRING MOUNTED CONVEYERS

WHY . . . . to lower maintenance costs.

WHERE . . . where the service is abusive to rollers, bearings, and axles.

WHEN . . . for new installations or to replace old equipment.



SPRING MOUNTED CONVEYER

Mathews Spring Mounted Conveyers are Protected by United States Patents Nos. 1,518,836; 2,077,188; 2,077,189; 2,077,190; 2,107,822 and Other Patents Pending.

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THE principle is simple; the roller axles are rigidly locked in the frame as in the conventional "rigid type" construction, but the conveyer frame which retains the rollers is carried on pre-compressed coil springs, the springs held in compression equal to the rated safe load of each roller. Under impact conditions or excessive loads the springs absorb the overload.

In pioneering this development Mathews Engineers have made available to industry nine sizes which cope with the majority of applications.

TYPE 33, Rollers 1⅝", 1.9", 2¼", 2½" diameters, 150 lbs. capacity per roller.

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TYPE 58, Rollers 3½" diameter, 2000 lbs. capacity per roller.

TYPE 63, Rollers 4¼" diameter, 4000 lbs. capacity per roller.

TYPE 110, Rollers 5" diameter, 8000 lbs. capacity per roller.

Ask for Data Sheet 24-A & B. It contains complete engineering data. The book "Equipping Industry for Continuous Production" illustrates installations. Both items sent upon request.

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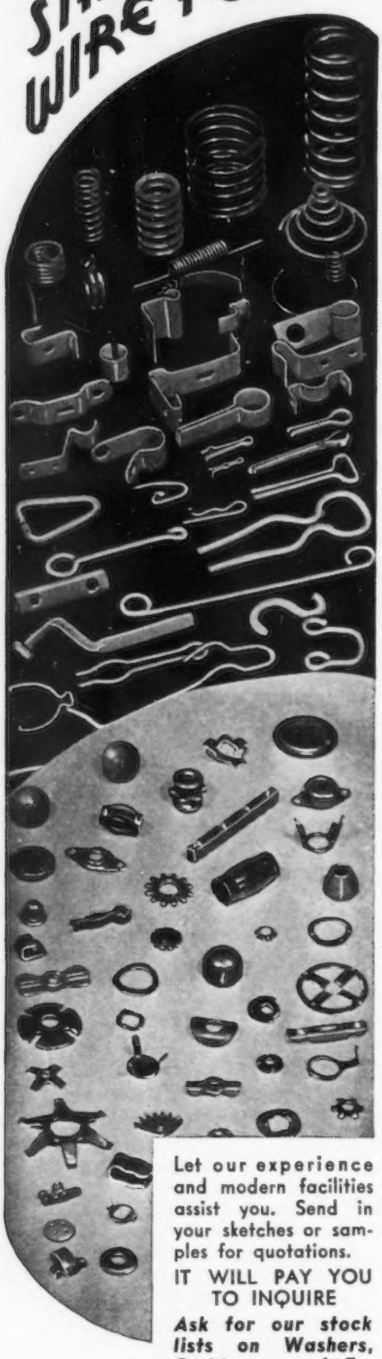

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M·D·Hubbard Spring Company

1905 1939

750 Central Ave., Pontiac, Mich.

This solder is said to have non-toxic properties and resistance to creep at moderate temperatures.

Among the most interesting prospects for tin are the production of tin plate by continuous hot dipping and also by electrodeposition — two long hoped for developments.

Aluminum

The transportation industry offers by far the most promising field for aluminum. It is now being used for pistons, connecting rods, diesel crankcases, airplane construction (including light weight air-conditioning equipment), bodies of trucks and buses, streamlined trains, tank cars for gasoline, the molding and trim of conventional railroad coaches and motorcycle parts. The marine field is also alive. Serious consideration is being given to aluminum for bulkheads and hull construction, davits, funnels, lifeboats, shade decks, pilot houses, pipe berths and cabinets.

Miscellaneous uses with good prospects include carboys for chemicals, beer barrels, photo-sensitive sheet for photography, drillable liners for oil wells, large mine cages and even aluminum "lungs" for paralysis victims. Recently also, small aluminum windows for residences have been made available, a very good addition to the building line.

Aluminum pressings, which have lately been shown to be cheaper than forgings and producible with greater accuracy, are likely to be more widely used.

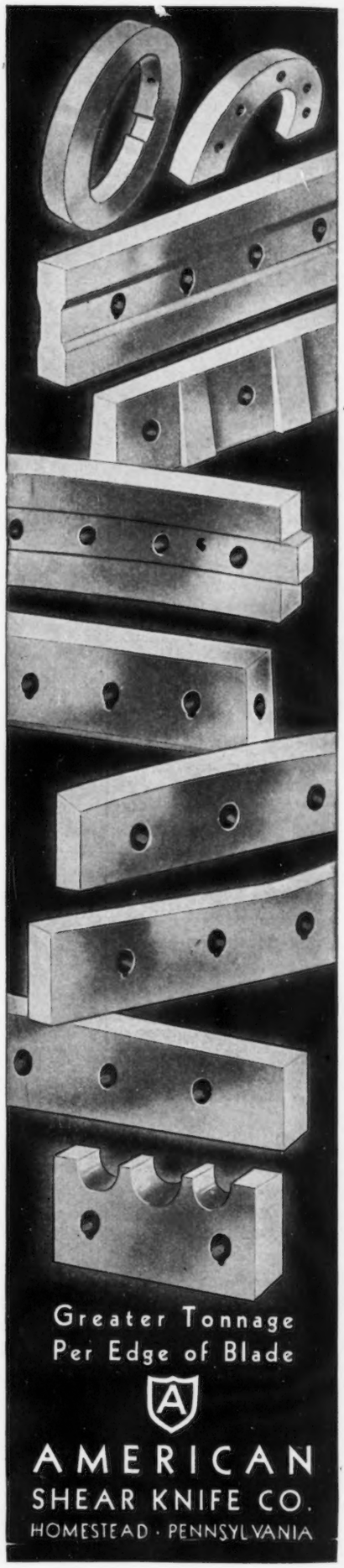
Aluminum coated steel is still one of industry's most interesting prospects.

The susceptibility of aluminum to improvement in properties by alloying and heat treatment is steadily widening its use in applications which demand strength. It has been effective in flood bulkheads in the Pittsburgh district and is being considered for similar use all along the Ohio River Valley.

Nickel

In spite of the decline of about 16 per cent in the total world consumption of nickel in 1938, the prospects for the coming year are most encouraging because of the numerous new applications uncovered.

New uses for nickel with a good future were found in ship building: nickel-clad steel plates for refrigerated holds of sea-going trawlers and cargo tanks for the transportation of lye and "water white" kerosene. In the min-



ing industry, in England, bronzes containing from 20 per cent to 50 per cent nickel and 5 per cent to 10 per cent tin are proving suitable for bearings with stainless steel shafts under corrosive conditions; also in pumps for handling copper sulphate affluent from copper mines. In the chemical industries, nickel alloys should be used more extensively for pipe lines and Monel for resistance to the corrosion of hydrofluoric acid and related compounds. The manufacture of ethyl cellulose may require the use of much nickel and nickel clad steel; also Monel and other nickel alloys for accessory processing equipment to resist the corrosive mixture of cellulose ethyl chloride and caustic soda.

The food industries are likely to use more nickel and nickel alloys in their processing equipment and also for cooling coils on freezing cylinders because of nickel's resistance to corrosion by cooling brine.

The Federal construction program assures a growing consumer for nickel bearing alloys in water power development, such as dams where "K" Monel has been specified for large valve stems, piston rods and other parts.

Radio offers a new possibility in the use of super-sensitive alloys of nickel, copper and iron to be used in the form of tape for magnetically recording speech and music. Thermostatic devices employed in household and industrial equipment should provide use for larger quantities of nickel. A new thermostatic protective device is reported for permanently protecting motors from overloads.

Nickel plating is one of the brightest prospects. A very noteworthy development is plating for utility; depositing heavy plates to protect strong alloys and mild steel base structures against abrasion and corrosion. Drawn shapes have been made from nickel plated strip to prevent scale when annealing. Hard, tough, built-up deposits are beginning to find a place in the United States in commercial practice. The hardness of these deposits can be well controlled, which makes them suitable for dies, rolls and other abrasion resistant machinery, and they are applicable to new work as well as to the salvage of mis-machined and worn out parts.

Bright nickel plating continues to grow steadily.

The household uses of Monel kitchen equipment, washing machine tubs, etc., continue to make increased demand for nickel. An interesting new application for Monel is the de-

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PICKLING TANKS

Courtesy of The B. F. Goodrich Co.

The above picture shows a double line of continuous strip pickling tanks installed February, 1936, in one of the largest steel mills in the country.

Tanks are of rubber lined steel protected with a double sheathing of acid brick and BASOLIT, consisting of eight Acid Tanks 60′ long x 7′ wide x 4½′ deep and four Water Tanks 25′ long x 7′ wide x 4½′ deep. The installation illustrated is one of many hundreds were BASOLIT has contributed toward long life and efficient operation of modern pickling equipment.

NUKEM PRODUCTS CORP.

Buffalo, N. Y.

New York **Pittsburgh** **Detroit** **Kitchener, Ont.**

velopment of a household cleaning sponge for pots and pans which has the advantage of durability and retention of its bright clean appearance.

Nickel shows a consumption by brass foundries for the first 10 months of 1938 equal to that of 1937; this in spite of the reduction in general foundry output in 1938. Heat treated bronzes containing 5 per cent of nickel are among the most promising mixtures. Others include the use of small amounts of nickel in manganese bronze, and tin base babbitts containing as much as 3 per cent of nickel.

Silver

Among the most fertile fields for silver is the chemical industry. Silver clad materials have been developed for processing equipment and containers; thin layers of fine silver sheet bonded to base metals, like copper, brass, nickel, steel, etc., giving a combination of the corrosion resistant properties of silver with the physical properties of the base metal; also appreciable economy.

Among the present uses for silver which show promise for the future, are the low temperature brazing alloys having properties like silver solders but with much lower melting points, permitting the joining of metals with strength at the joint equivalent to the strength of the metals joined, at temperatures lower than the customary welding requirements. This type of construction is finding steadily increased use in the air conditioning, electrical, household refrigeration, plumbing and heating fields.

Fine silver and silver alloys are being more extensively employed for electrical contacts because of the preeminent electrical properties of silver.

Silver bearing linings have been used with success for special heavy duty work.

The most noteworthy silver product recently developed is ductile silver powder composition. This powder is mixed with other metallic and non-metallic powders (such as graphite) giving a product which can be readily rolled and fabricated. It is recommended for electrical contacts and bearing purposes. These mixtures of metals and non-metals cannot be produced by ordinary casting and rolling practice.

Magnesium

Magnesium is due to make rapid strides in die castings and sand castings. Its most promising markets in these forms are aircraft, transportation, portable tools, vacuum cleaners, typewriter parts and packaging machinery. Remarkable development has taken place in the die casting of magnesium by the use of high pressure equipment, whereby from 3000 to 10,000 lb. per sq. in. are applied to the molten metal.

Metallurgical developments which should exert a favorable influence in the future of magnesium include alloys containing zinc, which are characterized by increased resistance to salt water corrosion and higher physical properties with heat treatment. Experimental work has also pointed to the value of the use of silver, from 2 per cent to 5 per cent, in extruded magnesium alloys, giving tensile strengths of 60,000 lb. per sq. in. and yield strengths of about 50,000 lb. per sq. in.

Important improvements made in corrosion and surface protection should open new fields. The use of zinc in many of the standard alloys,

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PNEUMATIC

the use of high purity alloys, the improvement of the surface by chemical or electrochemical treatment and improved paint coatings have made magnesium much less subject to salt water corrosion, and while this problem still exists, it is yielding to pressure of applied research.

Die Casting

In the die casting field the outstanding "comer" among metals is magnesium which is gaining steadily. Its outlook is decidedly bright.

Brass die casting is still being held back by the lack of the proper steel for dies. Nothing developed to date seems to be adequate. Here is a large field which needs attention by the steel manufacturers, and perhaps a wholly new approach.

Aluminum is being die cast in higher grade and purer state. The use of improved materials for melting pots and goosenecks and careful temperature control have sharply reduced the impurities taken up by the aluminum. The die casting of 99+ aluminum is now commercial. Aluminum alloy die casting consequently may look forward to greater use in 1939.

Zinc base castings are being made now in such thin-walled shapes as to begin to compete with sheet metal. They have spread into new uses such as lawn mowers, time clocks and scale model locomotives. Zinc will profit by the growth of the automobile industry as it is being used on the 1939 cars for die cast radiator grilles, louvers, body moldings and headlamp bezels, as well as hardware, ornaments, carburetors and fuel pumps. The American Society for Testing Materials has accepted as a tentative standard zinc alloy 25 which conforms to SAE 925, composed of aluminum 3.5 to 4.3; copper 0.75 to 1.25; magnesium 0.02 to 0.08; iron maximum 0.10; lead maximum 0.007; cadmium maximum 0.005; tin maximum 0.002; zinc, remainder.

Metal Powders

Metal powders have excellent prospects. Copper and lead, steel-backed bearings are prepared by the compression of copper-lead powder. Grinding and cutting wheels are being made with the abrasive material bonded by means of metal powders. Brazing compounds are made in powder form with or without the admixture of fluxing compounds. Non-ferrous metal powders are expecting a wide increase in use in exothermic heating compounds; for example, hair wave pads, hot water bottles, carriage boots, etc.

Applications of metal powders are broadening because of the improvement and the standardization of the equipment employed in the manufacture of metal powder products.

Electrocoating

Electrolysis as a method of zinc coating or galvanizing steel wire is definitely "on the march." The pioneer wire electrogalvanizing installation of the Bethlehem Steel Co. has been followed by others including Republic Steel Corp. and more recently by the Canadian Steel & Wire Co. More may very well be heard of this process during the coming year, not only on wire, but on sheet and strip.

Electrotinning has raised its head and should speak up for itself clearly in 1939.

Precision and Control Methods

Precision instruments for indicating, recording and control of temperature, pressure, etc., will be used more and

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The fins are clamped, the manifold is pressed into the fins, the return strokes of both cylinders—all accomplished automatically and in the proper sequence—this with the added advantage of a "safety" starting arrangement of the controls.

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more under the stimulus of the higher standards demanded by the consuming industries, which are steadily becoming increasingly exacting. They also cut costs appreciably, by the reduction of rejects. Bright annealing, brazing and soldering have become automatic and precise processes by the use of furnaces with temperature and atmosphere control. This trend toward closer control will continue.

Revised Tariffs

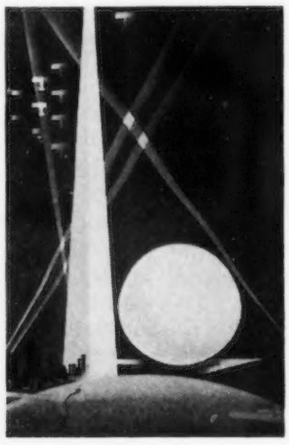
Complications in the non-ferrous metal industries may appear due to the reciprocal trade agreements consummated between the United States and foreign nations. Under the recent agreement between the United States and Great Britain, which became effective Jan. 1, our import duties are lowered on lead pigments, and on some aluminum, nickel, brass and bronze products. The duty on zinc is reduced from 1.75c. a lb. to 1.40c. a lb. on the metal and from 1.50c. to 1.20c. a lb. on the ore. As a result, the price of zinc was cut from 5.05c. per lb., Prime Western, East St. Louis, to 4.75 and then 4.50. The duty on cadmium has been reduced from 15c. to 7.5c. a lb., and on Nov. 22, the price was cut from 65c. per lb. to 60c. for commercial sticks and from 95c. per lb. to 85c. for patented shapes for platers.

Numerous fabricated metal products are also included in the tariff revisions. The total effect upon the non-ferrous metal industries as a whole "remains to be seen."

Promising Consumers of Non-Ferrous Metals

The consuming industries are the best gage by which to estimate the demand for non-ferrous metals in the coming year. The most promising are the automotive industry; the engineering and construction field (due to Government projects); the Government shops (due to the increased national defense program); the public utilities which, under more friendly relations with the Administration, are planning for considerable capital expenditures; the metal goods industry; the steel mills, which are using more and more non-ferrous addition agents and seem to be definitely working toward electrodeposited coatings. The non-ferrous metal mills are operating at an increasing rate (now about 70 per cent) and gaining momentum under the stimulus of rising unfilled orders. The food industries, the rubber industry (led by the automobile), the chemical industries and the paper, textile and soap industries appear to offer encouragement, reflecting the prospective general improvement.

But the most important future for expanded consumption of non-ferrous metals lies in building, which has constituted the leanest field during the past few years. Whether this improvement will come through renewed expansion of normal building and structures as we now know them, or whether it will come through the development of a new type of cheap "prefabricated" housing (which will still require non-ferrous metals for plumbing, hardware, trim, etc.) only the future can show. Rich as the field is, a very low cost pre-fabricated building is not yet perfected. The most encouraging factor in this situation is that the need is universally recognized and that real effort (and money) are being poured into research on this problem.



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The prospects for all the non-ferrous metals are not easy to sum up in a word; each metal has a different story. But throughout them all, their aggressiveness, their eagerness for better techniques, their energetic pursuit of wider markets, their laboratories alive with research—and achievement—combine to assure them a sound and promising future.

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AMERICAN is organized for swift and efficient production in any quantities required. Our own tool department, long rows of automatic machines, modern hand-working machinery for smaller runs, hundreds of tons of raw materials kept constantly in stock—all combine to assure dependable and speedy manufacture.
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WIDER USE OF *Arc Welding* FORESHADOWED *by* LINCOLN FOUNDATION CONTEST

ONE of the most notable events in the welding field during the past year was the revelation of new trends in design and application brought out by the $200,000 Award Program sponsored by the James F. Lincoln Arc Welding Foundation.

The purpose of this award program was to stimulate study of the possibilities of arc welding as a primary process of manufacture, fabrication or construction. Almost 2000 papers were submitted, and the 382 awards, ranging from $101, for honorable mention, to $13,941, the Grand Prize, were made.

The papers covered virtually all branches and ramifications of the metal working industry. In subject matter they were confined to the application of arc welding in whole or in part in the redesign of an existing machine, structure of fabricated product, or in an entirely new design. Another group was devoted to the organizing, developing and conducting of a welding service in connection with a job shop, garage, or commercial or plant weldery.

In all cases the machine, structure, fabricated or manufactured part was at least in the completed design stage; if actually built, it was not generally available prior to Jan. 1, 1937. In all cases, too, data on the economic and social advantages resulting from the new, weld-fabricated design were required.

Based on these requirements, the award winning papers contain much that is new and forward looking. They not only indicate increased use of arc welding, but in many cases open up entirely new fields for the process. Of future significance also is the fact that designing engineers in a growing number of industries are more fully aware of the possibilities of weld fabrication as a tool for the accomplishment of new and improved designs.

° ° °

R. E. MILLER
Machinery Editor

° ° °

New Type of Structural Framing

Developments revealed by the award program include a new type of structural framing suitable for floors and roofs, using welded rolled beams and saving 30 to 40 per cent of weight over conventional designs. The plane and spatial diagonal grids of this design are fully monolithic. Application of folded or curved grids can embrace almost any size or shape of roof structure, and makes it possible to span distances up to 300 ft. parallel to the ridge and valley lines and almost unlimited distances in the other direction. The monolithic spatial grids are said to fulfill the demand for large spans within bounds of practical economy, as ordinary rolled steel sections can be utilized. Cubic capacity and storage space are increased substantially because of the absence of columns, tie rods, bracings, etc., and goods can be stacked from floor level to the underside of the roof planes. In the case of both flat and spatial grids, erectors and welders work mainly at ground level. Cost savings averaging 20 per cent are claimed for this all-welded grid design, which has recently been applied in England.

Though comparatively small in size and cost, rigid frame steel bridges for highway separation, such as described in another paper, are important because of the large number required. The welded bridge described is about 100 ft. in span and carries a 30-ft. highway.

Outstanding in heavy miscellaneous structures was an arc welded elliptical tainter gate design for Dam 24, Mississippi River. The 80-ft. piers for this structure represent an increase of 33 1/3 per cent in the span of any previously known constructed tainter gate. High-tensile steel was used both to obtain substantial weight reduction and resistance to corrosion. Simplicity of details together with a marked reduction in number of parts feature the welded design.

In house construction a number of welded steel frame designs have been developed. One is a system using shop-fabricated "Module" welded-steel units, which are essentially pressed steel welded truss members with an attached nailing strip. The system uses about 1 ton of steel per 3000 cu. ft. of space, and the houses cost about 40c. per cu. ft. It is applicable to both single and multiple dwellings.

School Buses Now Welded

More extensive application of welding in truck and bus body design is indicated. In school buses, more than 84,000 of which were in operation in the United States at the beginning of 1938, the trend is strongly toward the all-steel body. One, designed for arc welding, the first of its kind, features production cost savings approximating 50 per cent, as well as considerably increased service life.

A truck body for use by transmission line maintenance crews of a power company employs high-tensile steel, arc welded, as the major material. Weight savings permit use of a lighter and less expensive chassis, and reduces

the cost of licensing the truck. Gross savings over a 10-year period, the useful life of the truck, are estimated at more than $5500, 10-year interest included.

Tractors are used in many remote corners of the world and reliable performance is, therefore, of basic importance. In a new model Caterpillar tractor, the track roller assembly, the member on which the weight of the tractor rests and rolls, is now made of weld-fabricated parts at an annual saving of $250,000. It is manufactured on a mass production basis.

New Railroad Applications

New developments in the railroad field include design of plate-type frame for a mountain-type steam locomotive to operate over 3-ft. 6-in. gage tracks in Australia. The welded construction is simpler, and there is a saving of 46½ per cent in cost and 27 per cent in weight. Loosening of bolts and rivets is eliminated; the more rigid structure also results in increased life of bearings, with considerable effect on cost of repairs and locomotive availability. Secondary economies include reduced machining. Reduction of 4 per cent in total weight of the locomotive increases the capacity of the engine.

A welded locomotive boiler has been designed, which, in having no rivets, no overlapping plates, and no threaded staybolts, offers the minimum of points for the accumulation of corrosive elements from boiler feed water or gases. There is also an initial cost saving of 10.2 per cent.

In freight car construction, a lot of 2600 all-welded underframes for box and automobile cars has been built. Prior to 1937 it was an open question as to whether welding could be economically introduced in freight car manufacture—a mass production industry. Welding is said to seal all joints against corrosion and to result in a stronger car body with less weaving of the structure. The design saves about 1000 lb. in weight, and some 10 per cent in initial cost. There is also a saving in maintenance.

New Airplane Applications

New uses of arc welding in the aircraft industry include a number of applications in fuselage construction. The heating of the cockpit and cabin of airplanes is an all-year round necessity, since at high altitudes 5 or 10-deg. weather is frequently encountered when the ground temperature is 95 to 100 deg. The heating boiler operates under severe conditions. Until the summer of 1937 boilers of the latest type used on certain airliners were averaging only 75 hr. of flying. Changes in material and design and, later, the adoption of arc welding resulted in continuous operation, without repairs, for more than 375 hr., an improvement of high value from a passenger reaction standpoint. A saving of $62 per unit in shop costs is attributed to the arc welding.

A type of construction and method of design which will permit arc welding in all-metal type of aircraft has been advanced. Steel frame elements are concentrated into relatively few members and balance of pressure forces are employed to stiffen the skin. The metal skin is attached by screws of self-tapping, self-locking type. The general method is said to be applicable to wings and airship hulls, as well as to fuselages. Advantages include low first cost; improved structural arrangement, by not having to provide internal access to rivets; general seg-

regation of structure, allowing plenty of room for wheel wells, fuel tanks and baggage space; and ready handling of concentrated loads from landing gear, engine nacelles, etc. Inspection and repair are facilitated by the reduced number of frame elements and the screwed-on skin; and an appreciable saving in weight is possible. With the development of new and better equipment and materials it is expected that the cost can be further reduced, even to the extent that relatively small, fabric covered ships can be redesigned in metal at a substantial cost saving.

More Welding of Water Craft

In watercraft, it is expected that the application of electric welding and the use of high-tensile steel will further increase in the near future. Elimination of angle steels and overlapping are the principal advantages of welding. Welded high-tensile steel construction is said to have been extensively employed in building submarines in 1938. Welding of the hull, the double bottom, the watertight bulkheads, the foundations and other parts of a submarine of about 1000 tons surface displacement, has resulted in a weight decrease of 65 tons, by means of which fuel stock and armaments can be considerably increased. With torpedo destroyers the weight savings will be utilized largely to increase speed and radius of action.

In a new 1000-ton capacity all-welded steel barge featuring design reduced to simple form, wide plates, now readily available, are used wherever possible, to reduce the number of joints. All plating, bars and flats are received from the mill with edges sheared to size and all shapes are standard. The various sections of the barge are assembled and welded in the fabricating shop and then transported to the launching ways and erected. Saving in weight is said to average 13.2 per cent, and in cost about 27 per cent. The welded design has 13 per cent more carrying capacity.

Welded railroad car floats for open-water service and accommodating 30 freight cars have been designed. The length overall is 360 ft.; the beam, molded, 48 ft.; and the depth, molded, 12½ ft. There is a weight saving of 12.3 per cent and a cost saving of about 14 per cent. The system of subassembly permits extensive use of flat welding, and handling of large units or panels in one piece reduces labor.

Redesign of the midship section of a 12,000-ton Great Lakes bulk freighter to employ arc welding has been proposed. The midship section covers the design of about 90 per cent of the total steel that makes up the hull structure, excluding the deck houses. The length of the vessel is 640 ft.; the breadth, molded, 60 ft.; and the depth, molded, 32 ft. Multiple units are built in the shop and assembled on the ways. Cost reduction of almost 26 per cent makes a saving or about $200,000 in the construction of the hull of one vessel. This would be increased by automatic welding. Greater safety at sea, reduced repair expenses, and reduced friction of the vessel traveling through the water are other advantages cited.

In pleasure watercraft, a small seagoing sailing yacht, a keel boat of curved molded section, has been built. The length overall is 35 ft. 9 in.; length at waterline, 27 ft.; beam, 10 ft.; and draft, 5 ft. The plating is 3/16 in. There is a saving in weight and in time of construction, and increased service life is attributed to the

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Safety for the Brakemen

Neither the gauge, size nor specifications of a stamping presents any obstacle to Parish. Skill, experience and equipment combine to make difficult stampings comparatively easy in Parish shops.

This non-skid brake step for box cars is ¼" thick x 30" long x 10" wide. The flange is 1". Embossing around the holes makes the step non-skid. Another of the many types of stampings produced by Parish for many industries.

Have you a problem that could be worked out in pressed metal? Our engineers will do it for you.

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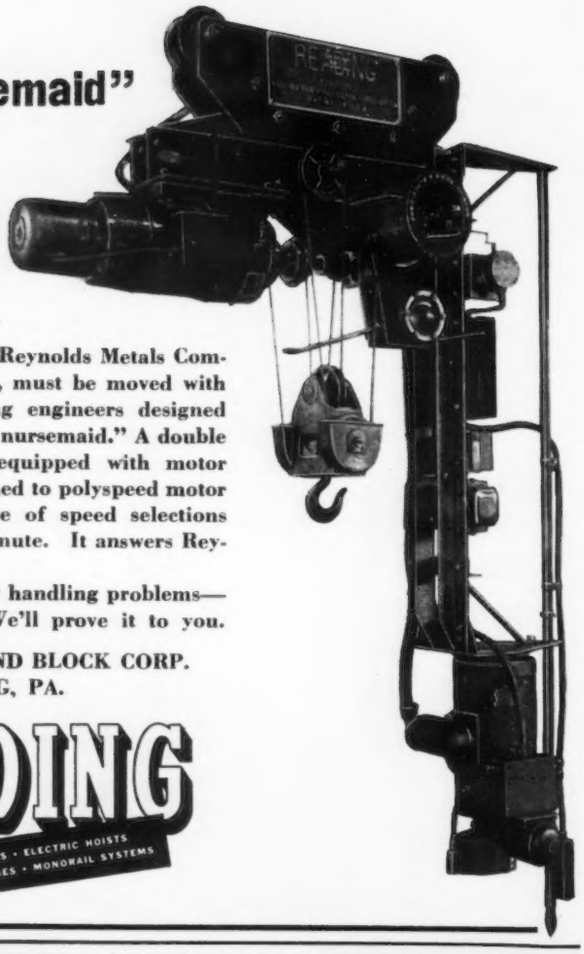
READING
Plays "Nursemaid" in Reynolds Foundry



FLASKS and molds in Reynolds Metals Company, Richmond, Va., must be moved with anxious care, so Reading engineers designed this special unit to "play nursemaid." A double drum electric hoist — equipped with motor driven Preset Head attached to polyspeed motor —gives operator a range of speed selections from 4 to 90 inches a minute. It answers Reynolds' SOS.

It's our job to simplify handling problems— cut production costs. We'll prove it to you.

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absence of leakage. By sand blasting and spraying the hull inside and out with molten zinc, the service life is increased to about double that of an ordinary boat. This also does away with the necessity and cost of frequent painting. Pleasure cruisers designed for fabrication by arc welding have also been built.

Welding Facilitates Furniture Construction

In less than a decade, metal furniture manufacture has grown into a sizable industry. Metal furniture has maximum durability and is light in weight. When welded it is homogeneous throughout. Simple, graceful designs are possible, and comfort is achieved by design that conforms to body form.

New arc welded constructions include an all-purpose steel table for conference rooms and hotel lobbies, libraries and other public places. Another manufacturer has developed a complete new line of chromium tubular furniture, including a suite composed of a chair and a davenport. Arc welding is applied after plating; this it is felt, will broaden the field for designers in the chromium furniture industry.

Tablet arm chairs are a necessity in all branches of education. Besides being used daily in the United States by more than 1,000,000 college and university students, 4,000,000 high school students, and an unknown number of primary school pupils, the tablet-arm type chair is used in night schools, lunch rooms, cafeterias and other places. A new arc-welded, steel-frame unit designed to meet more comprehensively all of the various requirements of such chairs has been developed. Advantages include attractive appearance, extreme durability, comfort, minimum resistance to floor cleaning, and perfect silence, obtained by no other means of construction.

Arc Welded Open-Hearth Binding

New applications of welding in the industry machinery classification, which includes steel making equipment, were particularly numerous.

By redesign for arc welding, an open-hearth furnace binding has been produced that is said to be approximately twice as strong and considerably lower in cost than the usual type. Savings in cost of the binding for the furnace, slag pockets, checker chamber and other miscellaneous construction around the furnace is said to be about $15,000. The saving of a large amount of time and money by eliminating delays of operation, is also said to result from the new design.

Arc welded table rollers for steel plant use have been developed. The design is said to be suitable both for the large, closely-spaced rollers near the mill and the lighter, more widely spaced rollers farther from the mill. The lighter rollers can be used at the mill tables, and for reversing or three-high mills, and due to the quicker "pick-up" or acceleration of the lighter loaded motors, the capacity of these mills would be increased. Lower costs, greater service life, higher efficiency, and reduced maintenance are expected.

A universal manipulator for handling parts up to 30-ft. in length during welding features operation through 360 deg. in either the vertical or horizontal plane, thereby presenting the work thereon at any conceivable position with minimum of effort to workmen or motors. Absence of any extensive "blind" areas permits access to almost any part of the piece being worked on—either top, bottom or sides—without subsequent resetting. The device is designed to carry a load of 10 tons. The design is said to overcome the limitations of other similar devices and to save the plant for which it was developed $42,720 a year—this on an investment of less than $5500.

Large Telescope Requires Unusual Accuracy

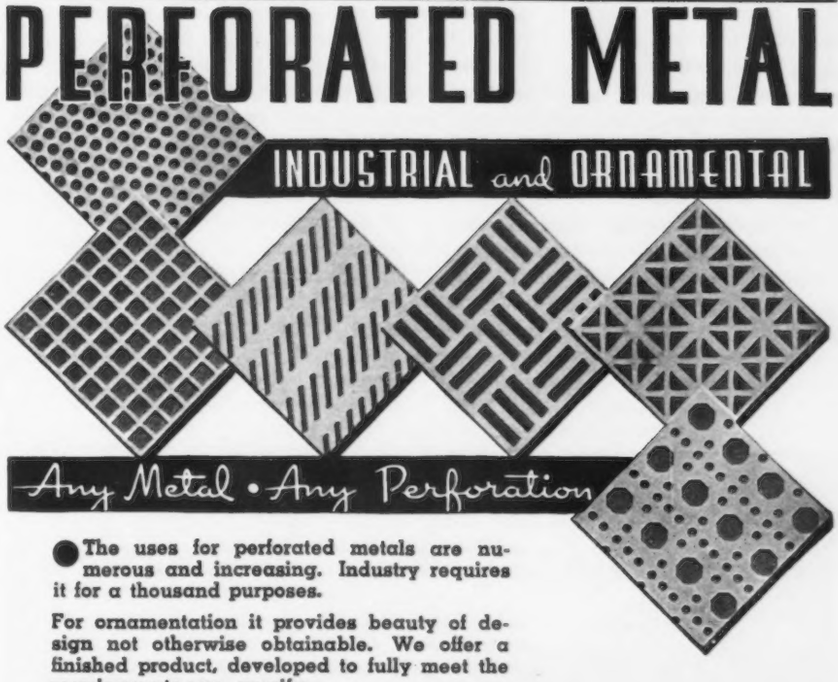
An outstanding use of arc welding is in the building of the 200-in. telescope and auxiliary projects at Mt. Palomar, Cal. The same process has also been employed in the construction of grinding machines and many other items of shop equipment. In the design of the 200-in. telescope accuracies never before attempted on a large scale are being accomplished; with a mirror ground to a surface departing only one-millionth of an inch from a true paraboloid of revolution, even extremely minute deflections are ruled out.

A new asphalt paving plant, the central mixing unit in the so-called "hot mix" or "plant mix" type of asphaltic concrete highway construction has been designed. The entire plant is of welded construction, resulting in simplified details and considerable weight saving. The saving of time in the design and construction was in this case, an important advantage, and the saving in weight kept the portable paving plant within legal load limits. Cost saving of about 40 per cent on the fabricated parts is estimated.

A company manufacturing bread slicing and wrapping machinery has redesigned the main housing of its machine to employ welded rolled steel and thus provide a base for a high grade and inexpensively applied paint job which could be more easily kept clean than the crinkle finish of the

PERFORATED METAL

INDUSTRIAL and ORNAMENTAL



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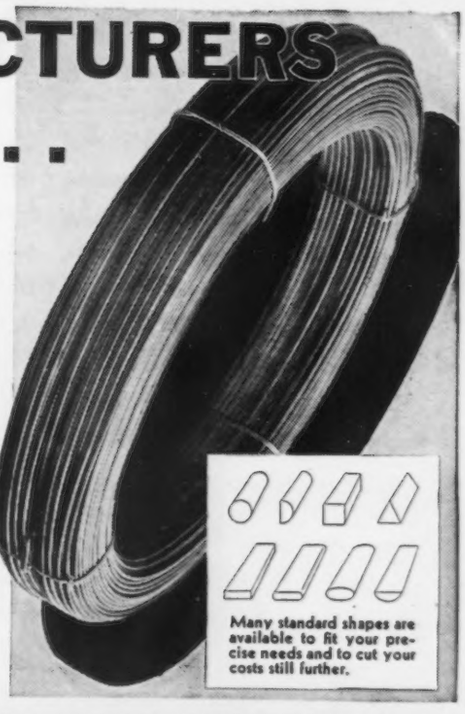

Products or parts made from wire usually can be made better or more economically — often both — by taking advantage of the correct combination of composition, temper, finish and shape offered by Continental's wide variety of specialized wire for manufacturing. Furnished in special-analysis open hearth steel; also in *KONIK, a patented steel containing copper, nickel, and chromium.

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previous cast iron housing. In this, a few sample welded steel machines were built. These required no special tools nor involved any other great outlay, as the 3/16-in. plates were shaped on a bandsaw and formed on a regular press brake. Furthermore, subsequent changes dictated by appearance, etc. were easily made with hacksaw, cutting torch and the arc. Later designs incorporated more arc welding, resulting, it is stated, in an improved machine built in less time and with less material. In addition, the reduced number of bolts, nuts, and other separate parts on a machine subject to vibration was of high value. Weld fabrication also eliminates the handling and machining of large and bulky parts on big machines operating at slow speed; instead, it makes possible the machining of small pieces in inexpensively-operated equipment. The first few slicers, built with equipment already at hand, served as test machines to prove their utility and as demonstrators to ascertain the demand for the new and different slicer. Little money was invested in the enterprise, and thus the weld-fabrication reduced the risk involved in the design and manufacture of a new product.

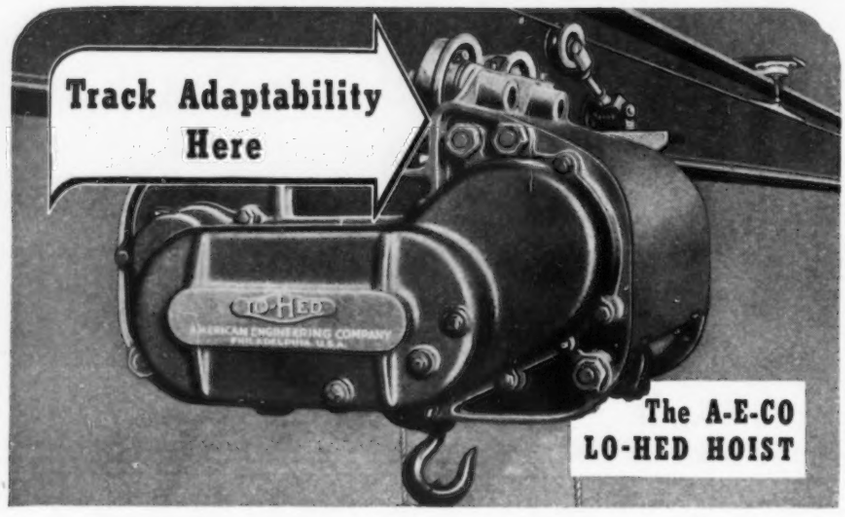
Arc welding has made possible the development of a new ore roaster, designed to handle 25 tons of pyritic, gold-bearing ore in 24 hr. Another machine that depends entirely on arc welding is one for the manufacture of hollow concrete building tile. An indispensible function is intensive vibration to compact the concrete into molds. Castings had to be massive and bolts or rivets with either cast or structural parts are said to have failed to maintain the rigidity required for continued functioning of the machine. The new design eliminates 62 moving parts, 58 patterns, 90 castings, and 2900 lb. of weight.

Weld fabrication of platen press frames is believed to be a pioneer application. A company making various sizes of heavy-duty cutting and creasing platen presses for box work and cut specialties found that by weld-fabrication the frame could be made stronger, lighter, more economically, and in much less time than a cast iron frame for which the company has patterns. Finished surfaces can be held close to dimensions, resulting in saving in planing time and in waste material. In painting the welded frame, preliminary snagging and the use of several filler coats are unnecessary.

Demand for elevator machines for unusually heavy loads and high speeds is comparatively small, and pattern and tool expense have to be spread very thickly over each unit sold, thus adding greatly to factory expense and lowering competitive advantage. To overcome this, one prominent company has developed a design, which except for the motor and brake, may be fabricated principally of welded steel. Savings in cost and weight are also accomplished.

Time Saved in Building Rotary Planer

Faced with necessity of procuring equipment for machining the roller paths of eight large tower cranes for shipyards, a Scotch company found that a standard vertical boring mill of 20-ft. capacity, such as previously used for this work, was not obtainable in less than 2½ years and would cost more than $58,000. A simpler machine, not capable of doing general work, could not be obtained in much less time. In view of these circumstances, the company designed and built an all-welded rotary planer for machining the crane roller paths. This



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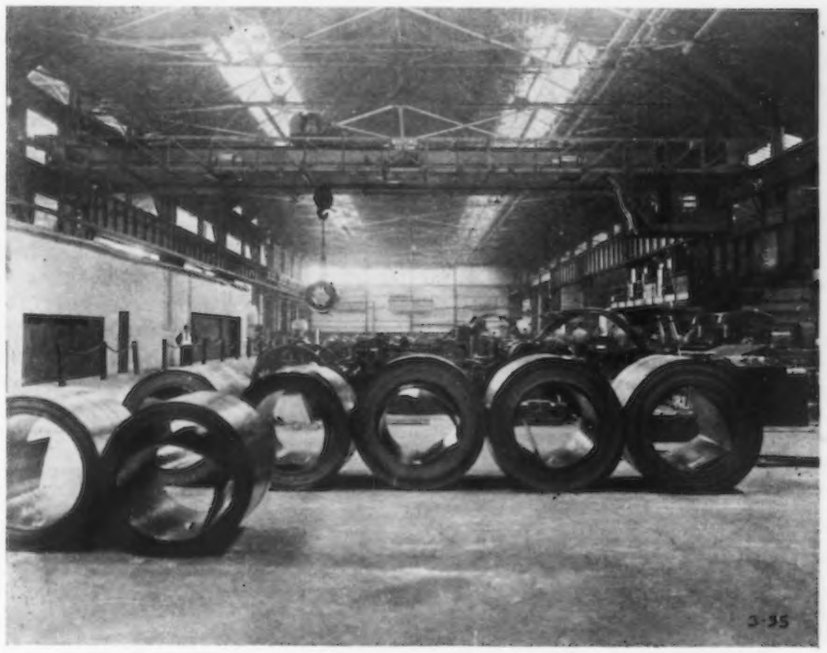
machine was actually in operation nine weeks after its design was started. With an overhead bridge, applied later, the total cost of the machine was $5200. The price quoted by an independent machine tool builder was $12,879, 18 months delivery. The greater part of the saving was due to adopting an entirely new design which allowed use of fabrication and machining not applicable to a cast design.

Another machine tool employing weld-fabrication was a redesigned metal-cutting planer having a table 86-in. wide, 32-ft. long; a bed 72-in. wide, 62-ft. long; a distance between housings of 138 in.; a distance under the cross-rail of 88 in.; a cutting stroke, 30 ft.; and a total weight 175,000 lb. A machine of this capacity would only be built on order and specific pattern charge would have to be made against it. A saving of 35,500 lb. or 26 per cent, and in cost, about $1361, or 21 per cent, is claimed. Flexibility in meeting customers requirements as to specific dimensions at little added cost is also an advantage. As stress relieving not only eliminates the stresses set up in welding but also any rolling strains in the plates themselves, all the steel members are entirely free from internal strains and would therefore hold their machined alinement indefinitely. Less horsepower and greater speed are attributed to the lighter tables. Furthermore, the weld fabrication provides greater freedom with regard to new ideas and improvements, as engineers would not be confined to existing patterns.

Arc welded hydraulic riveting machines are being regularly furnished by a Scotch company. One is specially designed for work in a restricted space; in fabricating the bulkhead frames of a ship's hull. Use of high-tensile steel plates made possible a narrow frame without undue weight. The welded design is said to be 42 per cent lower in cost and to have proved more reliable. There is a complete freedom from sudden fracture.

Adoption of weld-fabrication has solved important problems in the development of the Addressograph, the office machine that has taken the drudgery out of routine copying of names, addresses and other short data. Increasing complexities of application are said to have suggested refinement of design, and even the development of a more versatile machine. A revolutionary recent change has been the making of the bed and printing arm in one unit, made possible by welding. This not only reduces in weight and cost, but provides a unit in which there will be no deflection, even in the absence of the previously used pressure block. Furthermore, the one-piece construction will simplify the manufacture of the entire machine and therefore reduce costs throughout. Compactness and greater coordination of design are possible through the simplified construction and the new Addressograph resembles an office fixture more than a factory machine.

In addition to the many significant new applications of arc welding affecting the products or the manufacturing equipment of a wide variety of industries, the Lincoln Foundation's recent award program revealed high development of commercial and plant welderies. This includes engineering and design, business promotion, testing and research, and shop organization, layout and shop equipment that assures service of a very high order. It was an outstanding paper in this classification that won the Grand Award in the program.



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Gas Flame Technique

SUBSTANTIAL increase in the application of all oxy-acetylene processes—cutting, welding, flame hardening, and flame softening—are expected, especially with increased activity in the metal working industries. Very large volumes of oxygen and acetylene for cutting will be required during the next several years in connection with shipbuilding, especially naval construction, according to F. E. Rogers, engineer, Air Reduction Sales Co. The shipbuilding program will also entail heavy demand for welding electrodes. All-welded vessels, launched or begun, during 1938 range in size from small pilot boats to 18,500-ton tankers; of these an all-welded ship with nickel bulk-cargo holds for transporting corrosive chemicals is noteworthy. Acceptance of structural steel welding in building construction is definitely indicated by recent applications in New York City and elsewhere, and undoubtedly any considerable gain in the volume of steel construction in the next few years will mean an increase in the use of welding.

The oxy-acetylene flame for surface hardening, at first applied widely in the hardening of gear teeth, is now applied to lathe beds, camshafts, crankshafts, small parts of light machinery, automobile hubs, and the surfaces of heavy machine members too massive for heat treatment by other methods. Possibilities for further extension are said to be limited only by the ingenuity of manufacturers in devising suitable mechanical control equipment.

Active interest in the welding of oil-well casing is reported. With increasing experience on the part of the contractor and the welder, there is every reason to expect this operation to become standard in the oil fields, as has the welding of pipe lines, by torch or arc, states Mr. Rogers.

Torch descaling of steel billets and structural shapes has come forward as an economical substitute for pickling and as a satisfactory surface preparation prior to painting structural steel.

Multi-Flame Tips for Pipe Welding

Two new multi-flame tips for oxy-acetylene welding blowpipes were brought out last year by the Linde Air Products Co. These are a four-flame tip for position welds and a six-flame tip for rolling welds. Savings in welding time in overland pipe line work are said to have amounted to 60 to 75 per cent for rolling welds, and from 30 to 65 per cent from position welds, over single-flame welding. Substantial economies in the consumption of gases and welding rods are also realized. A new low-alloy steel welding rod for overland pipe line welding, featuring increased strength was announced by the same company.

Multi-flame tips have come into wide use for welding oil well casings. In the welding of deep-well casings, the increased speed possible with the new tips is of particular importance, as a delay in the sinking of the casing may cause the drill holes to become

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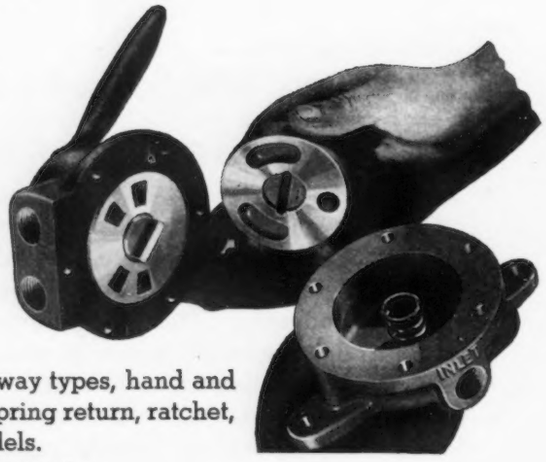

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clogged. Deep-well casing is usually welded into 80-ft. lengths before it is swung into position for the tie-in welds. It is stated that with the new four-flame tips designed for this work, two operators can complete one of these tie-in welds in 1½ to 4 min. in casings ranging from 5 to 10¾ in. in diameter.

Machine welding with multi-flame heads is also contributing greatly to increased speeds in the manufacture of certain metal products. Whenever parts are produced on a quantity basis, and the same type of weld is made over and over again, it is frequently expedient to use multi-flame heads and mechanize the motion of the blowpipe with respect to the work. Increased production, with neater, smoother welds are obtained.

Wider Use of Flame-Cutting

The year 1938 saw a widening scope of applications for the oxy-acetylene flame, particularly in the shape-cutting of metal parts to be used in the fabrication of machinery, equipment, implements, etc. Other operations in which oxy-acetylene cutting has been employed on a wide scale are: cutting heavy scrap metal to smaller size, removing "risers" from steel castings, coping I-beams and structural members, cutting off rivet heads and stay bolts, nicking billets and cropping blooms, and beveling parts preparatory to welding.

Quantity production of parts flame-cut from relatively thin steel plate by oxy-acetylene cutting machines, is greatly facilitated by the use of a method that involves piling a number of plates one on top of another, clamping them tightly together, and making the cut as if the clamped plates were one piece of solid metal. Stack-cutting emphasizes the importance of oxy-acetylene machine-cutting in mass production operations.

In stack-cutting, as in the flame-cutting of a single plate, the drive wheel of the cutting machine can be guided by hand or made to follow a templet design automatically. Under proper operating conditions, the surface of the cut edges on all the stacked plates is smooth and even, so that further machining is reduced to a minimum and is frequently eliminated entirely, especially if the edges of the sheets are subsequently to be welded.

A particularly advantageous feature of stack-cutting is the large saving usually obtained from the recovery of useable new material because the metal removed is in sufficiently large pieces to be useful for the manufacture of other parts. Frequently, by proper designing, the scrap can be used without further fabrication.

The edges of the oxy-acetylene cut sheet are square and full with no burrs or slivers. This advantage is important on circles that are subsequently to be flanged or dished. There is an entire absence of tearing when the oxy-acetylene stack-cut sheets are formed due to the fact that the cut-

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ing operation does not leave any sharp corners which have high-stress concentrations and which yield under the additional bending stress of the pressing dies. The radii left at such locations in the sheet contour tend to strengthen this section and provide additional material for the drawing action of the die.

Oxy-Acetylene As a Source of Heat

One of the most important advantages of the oxy-acetylene flame as a source of heat for forging, forming, straightening, bending and pressing operations, is the speed with which the necessary heat can be obtained. With temperatures approaching 6000 deg. F. available instantly, a very steep temperature gradient can be established between the source of heat and the work, and as the heat is highly concentrated, it flows rapidly into a very small area adjacent to the flame. The utility of the process has been considerably extended by the development of large-capacity heating blowpipes and multi-flame heating heads.

Portability is another important advantage. The oxy-acetylene blowpipe saves time by making it unnecessary to dismantle a large structure or machine in order to heat the particular part to be bent or straightened. Another important feature is the ability of the operator to regulate at will the heat intensity across a section.

One of the more recent applications of oxy-acetylene smithing is the field fabrication of bends in overland piping. The process, known as wrinkle bending, is said to have a number of important advantages, including speed, economy, and better pipe-wall characteristics.

Flame-Hardening

As a means for hardening the wearing surfaces of steel and iron parts, flame-hardening has grown considerably. Typical of the more recent applications is the use of the oxy-acetylene flame for hardening cylindrical objects, such as calendar rolls used in paper making, rolls used in the processing of sheet rubber products, steel mill rolls, leveling rolls, pump plungers and the bearing areas of shafts. These are usually hardened in a vertical position by the progressive spinning method.

One of the largest jobs thus far handled, according to Linde Air Products Co. engineers, was a 12-in. diameter, 108-in. long calender roll made of forged S.A.E. 1045 steel. This roll was hardened in a vertical position with 24 seven-flame heating heads progressing from the bottom to the top

of the roll at the speed of 4 in. per min. The roll was spun during the hardening operation, and the whole job took 30 min.. A surface hardness of 600 to 650 Brinell was obtained.

Rolls for processing rubber are regarded as an ideal application for flame-hardening because the engraved designs on their surfaces must be distortion-free and as wear-resistant as possible. Even slight damage of the engraved surface means that the rolls are beyond repair. A difficult job consisted in hardening a 10-in. diameter roll to 700 Brinell with 20 seven-flame heating heads. In spite of the corrugations on the surface, a uniform hardness as well as uniform depth of hardness was obtained over the entire roll surface.

Flame-Softening

Flame-softening is cited by the Linde company as another instance of the trend toward more efficient heat utilization by means of multi-flame heads. As a means for removing the undesirable hardness along the flame-cut edges of low-alloy, high-strength structural steels, flame-softening is making possible more economical fabrication of these steels. Flame-softening is also being used increasingly for a variety of other applications. One steel mill, for example, uses the process to facilitate the machining of cylinders and shafts.

Flame-Conditioning Semi-Finished Steel

One of the most spectacular oxy-acetylene developments in recent years is the use of the process for removing surface defects from semi-finished steel. Various terms are used to describe the process such as deseaming, desurfacing, scarfing, and flame conditioning. Deseaming is generally applied to hand operations on cold slabs and billets. Here, specially designed blowpipes are utilized to "wash off" sections of the surface that contain the imperfections. Sufficient steel in the vicinity of the defect is removed to eliminate the defect itself and leave clean, sound steel.

Through the development of suitable machines, the method has been extended to permit the removal of the entire surface of a billet, bloom, or slab, whether cold or hot. This eliminates the necessity of inspection and marking of individual surface defects, an operation which was impossible with hot steel. Two types of machines have been developed by the Linde Air Products Co. One is the "Lin-de-Surfacer" conditioning machine, which is stationary, suitable for flame-conditioning semi-finished steel in the

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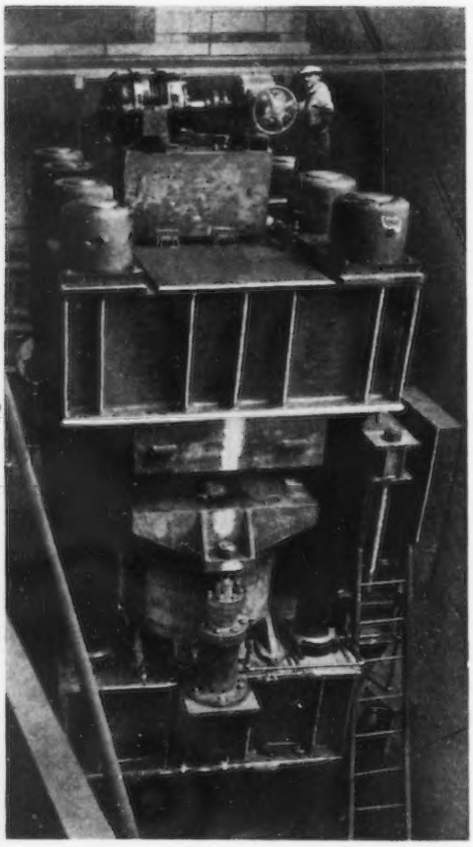

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rolling mill while the steel is moving on the roll tables, and the "Linde" Surface Remover machine, which moves over the steel, for conditioning ingots, slabs or other semi-finished forms laid down for this purpose on the bed under the machine.

The "Linde" Surface Remover is designed for conditioning ingots, blooms, billets and slabs removed from the roll tables. It is a bridge crane type of machine which travels above the steel and removes the top surface at a rate of from 40 to 80 linear ft. per min. It will condition either cold or relatively hot steel, the upper practical temperature limit being approximately 1000 deg. F. It can be installed at any location in the mill.

The problem of supplying the high oxygen and acetylene loads that are required instantaneously at hitherto unheard-of rates of flow, yet intermittently, in the operation of these steel-conditioning machines has been met with new equipment and methods such as the "Driox" liquid oxygen supply system. Large capacity acetylene generating apparatus has been developed to supply the heavy intermittent acetylene loads incident to the operation of these machines.

Unionmelt Welding Process

The same company has developed a new electric welding method, named the Unionmelt, for automatically making butt welds, fillet welds, and plug welds. Welds of consistently excellent quality and high strength can be made in low-carbon and medium-carbon steels, stainless and many of the well-known alloy steels.

The process employs as an electrode a bare welding rod which is automatically and continuously supplied either in straight lengths or from a coil mounted on a reel. It uses the heat generated by the passage of an electric current from this rod electrode to the work being welded. The end of the electrode is constantly covered by a special granulated material known as "Unionmelt" welding composition, which is automatically laid down in advance along the seam to be welded.

When in the molten state, this granulated material is a highly resistant conductor of electricity, and hence makes possible the use of very high current densities which cause rapid generation of intense heat. At the same time the granulated material acts as a good thermal insulator and concentrates the heat in a relatively small welding zone where melted electrode metal and melted base metal are thoroughly fused. The molten portion of the layer of Unionmelt welding com-

position floats as a liquid blanket over the molten weld metal, protecting it from the atmosphere and other gases. The actual welding takes place beneath this liquid blanket without sparks, spatter, flash or any visible evidence of an arc. In addition, the liquid blanket of molten Unionmelt acts as a cleanser for the weld metal, washing the metal which melts from the rod and absorbing impurities from the fused base metal. Consequently the weld metal, it is said, is exceptionally clean and dense, and has excellent physical properties.

The Unionmelt welding process uses either a.c. or d.c. current from 20 to 55 volts across the welding zone. Amperages are much higher it is explained than those used mith metallic arc welding processes. For example, in one-pass welding of steel plate 1-in. thick, 1500 to 1600 amp. with 5/16 in. diameter electrodes are used. One pass welding of 1-in. plate can be accomplished at the rate of 10 to 12 in. per min. By using various combinations of amperage, voltage and welding speed, the shape and reinforcement of the welds can be varied and the depth of the fusion zone can be regulated as desired.

The process has been used in the fabrication of ships, barges, railroad cars, locomotives, pipe, tanks, pressure vessels, caissons, annealing boxes, large machinery parts, and special assemblies for various uses. It is said to be applicable also in the manufacture of automobile parts, small machinery frames, structural shapes, special pipe fittings, and many smaller items are produced in considerable quantities.

In addition to those cited above, advantages emphasized for certain types of fabricating operations include: Unusual strength, durability, shock resistance, uniform density and corrosion resistance, with physical properties often better than those of the base metal. Welds made by this process have met the specifications of the A.S.M.E. code for fired power boilers and class I pressure vessels, and have been accepted by various insurance and inspection companies. For ship welding they have been approved by the American Bureau of Shipping and Lloyds Register of Shipping. A wide range of commercial thicknesses of metal can be welded in one pass with complete fusion and penetration. The Unionmelt welding process requires much smaller quantities of weld metal, it is pointed out, not only because of the smaller vees required but also because all metal losses due to spatter, vaporization, and stub ends are eliminated. Since the process is automatic, weld quality depends on controllable mechanical and electrical conditions, and there are no sparks, spatter, fumes, smoke, or light.

Intense heat is rapidly applied in a small space, it is further explained. The entire cross section of the weld is molten at one time and the speed of welding allows virtually no direct, useful heat to be dissipated into the zones adjacent to the weld. Distortion is minimized and total contractional stress reduced. For many Unionmelt welds, no plate preparation is required. When beveling is necessary, the bevel is small and straight, and the vee between abutting plate edges can be made much smaller, it is said, than with other welding methods. Fillet welds for T-butt joints with complete fusion and overlapping penetration can easily be made in thicknesses up to ¾ in. without beveling.

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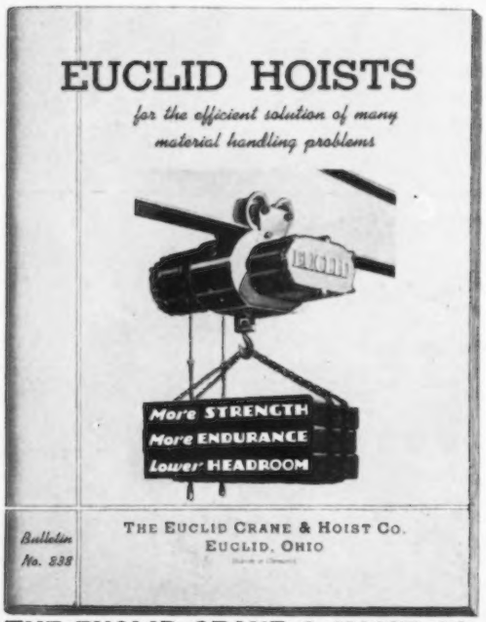

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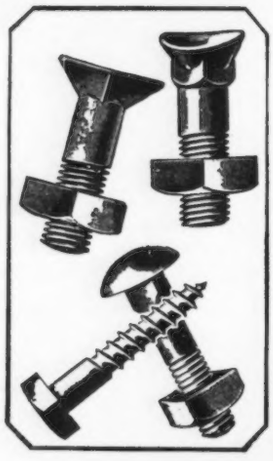

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BOLTS

WORLD

PERHAPS the world has a few steel makers now singing the liturgy of year-end platitudes, but the majority of producers are hard-pushed to review 1938 with much enthusiasm. No producer could show much black ink, no matter how necromantic the bookkeeping. Those in democratic countries were and are chevied by an assortment of economic dislocations, and while those in nationalistic countries are by decree forced to smile they are by decree also so circumscribed as to preclude intelligent and efficient operation. And, even though they all, democrat and nationalist, are prideful of spectacular technical advances, they can't but help express not a little concern about the religion of self-sufficiency dominating even the smallest of non-industrial countries, the universal dependence on governmental buying and armament production, and the comparative languishing of that most profitable and promising of all outlets, consumer goods.

After reaching all-time record levels in 1937, world production of pig iron and steel ingots in 1938 fell off 22 and 21 per cent respectively. These declines are reflections of the influence of the recession on United States production, which on the average is one-third of the world total. New record production records for the U. S. S. R. and Germany partially offset the decline in the United States, and while England and France both suffered somewhat their influence on the world total is quite nominal.

Only in Germany did pig iron production in 1938 diverge from a conventional pattern. With limited scrap supplies available and with little money with which to import old material, Germany has laid down strict laws regarding the scrap-pig iron proportion permissible in each heat, in some instances compelling works to charge nearly 100 per cent pig iron. With this excessive load on pig iron facilities, Germany went so far as to blow in Austrian furnaces idle since 1918 (Alpine Montan Co.), and to draw on low-grade iron ore deposits, some of which have never been worked and others of which have been idle for many years (20 per cent Fe ore

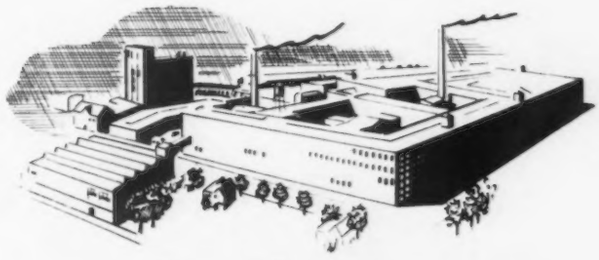
OUTPUT . . . of Steel

WORLD'S 1938 steel output just soso, being 21 per cent under 1937 but still 112 per cent above the abyss of 1932. Lashed by totalitarianism and "appeased" with steel properties, Germany threatens the preeminence of the United States. Capacity spurts under the cosseting of nationalistic governments, the emphasis lamentably being on shells, not tin cans; on tanks, not automobiles.

south of Oldenburg; and similar ore at Peine; and 25 per cent Fe ore in Southern Sweden). All this resulted in a record pig iron production of 18,200,000 tons in 1938, considerably at variance with the world's average pig iron-steel ratio, but nonetheless a production that came within a million tons of the United States total.

German steel ingot output in 1938 also reached a record level, being 22,600,000 tons, or within 6,000,000 tons of the U. S. total. For the entire year, German production was subject to insistent calls from the military. Output was composed primarily of forgings, plates and heavy bars, with typical consumer goods like tin plate, sheet and strip occupying minor positions and very difficult to secure because of government regulations.

In being "appeased" with Austria and a major chunk of Chechoslovakia, Germany acquired some attractive steel, coking coal and iron ore properties. Austria contributed a yearly output of 500,000 tons of ingots, fully supported by local iron and coal mines. In Czechoslovakia, Germany took over coking coal in the Ostrava-Karvinná district of Moravia, the Mannesmann Tube Co.'s subsidiary at Komotau, and the Komotau branch of the Poldi Steel Works, at which there are electric furnaces, forges and high quality bar and strip mills. Poland took over about 700,000 tons of steel capacity at Trinec, but Czechoslovakia has managed to retain most of its iron deposits at Slany and at Spis-Gemer. More im-



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WORLD PRODUCTION (1937-1938) (In Thousands of Gross Tons)	Pig Iron†		Ingots and Castings	
	1938	1937	1938	1937
United States	19,341	37,127	27,996	50,569
Germany††	18,200*	16,026	22,600*	20,161
U.S.S.R.	14,845*	14,231	18,405*	17,497
United Kingdom	6,700	8,497	10,420	12,964
France‡	5,650	7,792	5,780	7,779
Belgium	2,330	3,782	2,210	3,808
Japan§	3,100	2,900	5,860*	5,719
Luxemburg	1,415	2,473	1,400	2,471
Czechoslovakia	1,200	1,649*	1,750	2,281*
Canada	748	979	1,130	1,352
Italy	850*	843	2,250*	2,054
Poland	930	713	1,440	1,420
Sweden	650	636	920	1,113
Spain	206	190	235	210
All other countries‡‡	3,180	3,350	3,200	3,900
Total	79,344	101,188*	105,596	133,298*

† Includes charcoal iron and ferroalloys. †† Includes Saar district and Austria. ‡ Includes Alsace-Lorraine. ‡‡ India, Australia and South Africa account for a good portion of the totals. § Includes Korea and Manchuria. * Highest yearly production.

portant to Germany than Czechoslovakia's properties is the fact that partition has pretty well throttled a tough competitor in Central European markets.

Primed with money at home and taking over properties available by anschluss, Hermann Göring's government steel works is becoming a dominant factor in Germany with a yearly capacity close to 6,000,000 tons, the major portion of which has been newly constructed or is now building. Evidently private producers fear excessive competition, for Dr. Röchling of Röchling Iron & Steel Works (Saar) has been instructed to put out the dope that the future is rosy for all.

North of Germany, Russia likewise continues in the throes of a building campaign, and the table above shows a 1938 record production of 14,845,000 tons of pig iron and 18,405,000 tons of steel ingots. During the year Russia completed or started one blast furnace and two 30-ton converters at the Krivoy Rog Works; four open hearths, a blooming mill and a wire mill at the Stalin Works; two blast furnaces and two open hearths at the Novo Tagil Works; three open hearths and a continuous (900,000 tons) hot and cold strip mill at the Zaporozhstal Works; two blast furnaces at the Azovstal Works; a wire mill at the Makeyevka Works; and two plate mills at the Novomoskovskom and Kirov Works.

On the other side of the world Japan likewise has spurted ahead with a record steel output of 5,860,000 tons, which is still, however, an indifferent production as compared to the world total. But Japan has very big plans. Faced with poor home reserves and badly needing steel for the army and navy, Japan has resorted to direct government subsidy. Japanese metallurgists continue to harp on the high-frequency smelting of local iron sands, but for the most part this seems to be wishful thinking. More success has attended conventional operations in Manchuria and China. Pig iron in moderate quantities is now coming out of Manchuria, but the exploitation has been very expensive owing to the necessity of concentrating the poor quality iron ore. In China, Japan is now in possession of fair quality iron ore and coking coal deposits, but economic working of these assets will take many years and more yen than Japan can now scrape together.

Of the other world producers there has been little of interest developed. Sizable works are being constructed in

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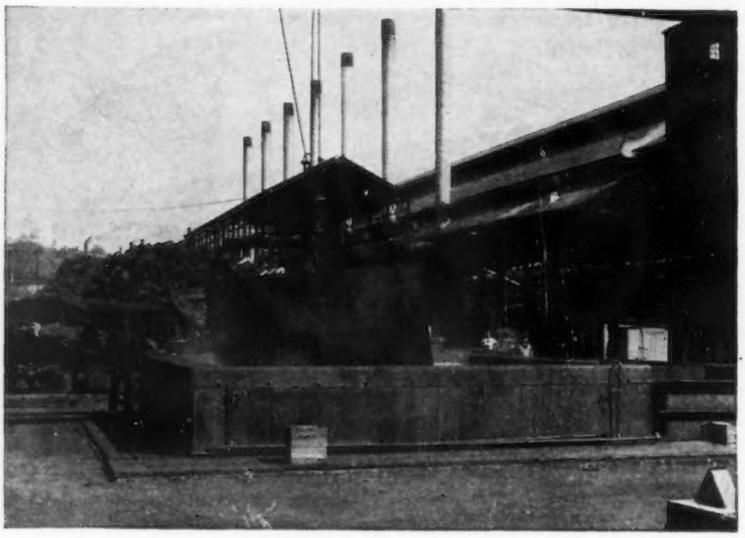

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Turkey, near Zafranbol, using local ores and coal. This fully integrated establishment will soon be blanketing the Turkish market, output being estimated at 600 tons of ingots daily. In Brazil, steel capacity is being raised step by step, the intention being to supply most home needs within a few years and even do a little exporting. Bulgaria, a country normally importing 30,000 to 40,000 tons of steel annually, is now swinging into the self-sufficiency parade. The country has some small but rich magnetite deposits, considerable quantities of hematite, and some coking coal. The plan is to erect soon two blast furnaces and some small rolling mills to supplement existing furnaces.

So, the world steel picture in 1938 is still a continuance of the trend initiated four or five years ago. Established producers such as the United States, England and France, are concerned with the technical improvement of existing capacity, meanwhile suffering somewhat in relative position as Germany, U. S. S. R., and Japan rush through new capacity. At the same time, many of even the smaller countries, imbued with the necessity of a sealed economy, continue to build mills to satisfy domestic requirements even though such mills are not justified economically.

Armament Program and Capital Goods

(CONTINUED FROM PAGE 92)

take about six months to mobilize steel mill facilities to meet war demands and at the same time be prepared to serve domestic requirements. As war continued and heavier drains were made on the industry, manifestly it might be necessary to create additional capacity. At the sacrifice of internal requirements, however, it is indicated that the industry could be put on a complete war footing in less than six months.

A Wolf in Sheep's Clothing?

Most of the opposition thus far registered in Congress stems from the fear that concealed in the armament proposals is a scheme to perpetuate New Deal political power and to obtain new tax money in an undertaking which is difficult to oppose. Some Congressional members have expressed concern that the armament plans would mean "war taxes," throwing an unbearable burden on the taxpayer and overlapping with "relief taxes." Others openly have charged "propaganda" insisting that militarists and "super navy" groups were using "war hysteria as a cover for another pump-priming program designed to aid heavy industry." Business groups have warned that further increases in armament expenditures should be fully justified before being approved, and that such expenditures are ill adapted to pump-priming purposes.

Presumably the Administration, in switching from relief to defense payrolls, does not propose to start relief recipients making munitions or on other industrial pursuits requiring highly skilled labor. Rather, the plan appears to be to direct their efforts toward the construction of airports, hangars, military sidings and trackage, Army posts and barracks and similar jobs.

The potentialities for shaping many of the country's economic policies to

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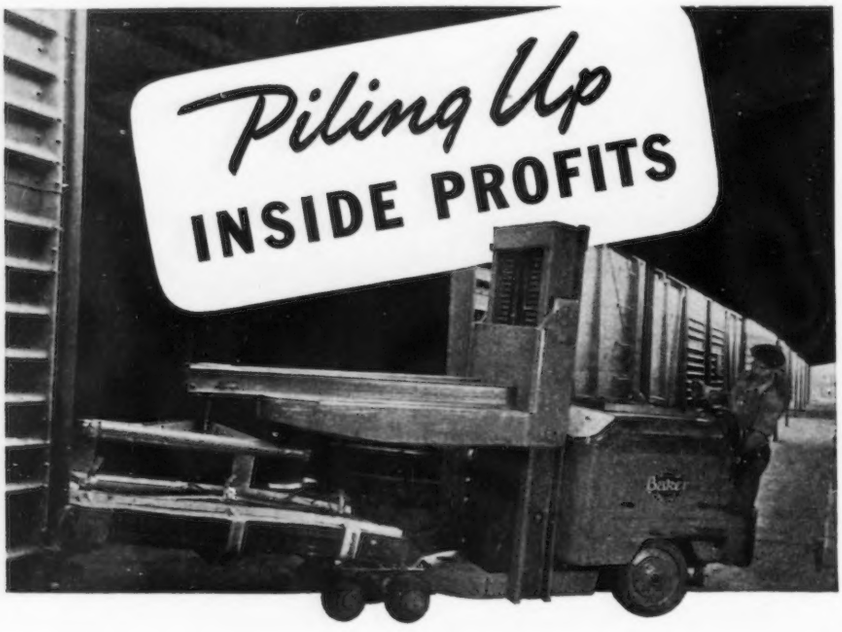
conform to Administration theories under cover of a national defense program admittedly are enormous. As an illustration, there are rumors that the move to put the nation's power resources in top-notch efficiency may be pushed to encourage the decentralization of industry. Such a step would fit in with what the Army has always regarded as a serious problem, the concentration of industry in well-defined areas and vulnerable to aerial attack. It would dove-tail with the New Deal philosophy of uniformly distributing jobs, population and income and provide outlets for power produced by isolated Administration-sponsored power projects.

Critics will be in general accord that the possibilities for advancing New Deal theories via its national and hemisphere defense aspirations are virtually unlimited and that these possibilities far outdistance powers heretofore bestowed upon the New Deal since it first came into power in 1933.



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Legislative Carryover

(CONTINUED FROM PAGE 98)

old age assistance, children's health, vocational education—all programs under the Social Security Act. All of these are Federal-State aid programs but in every case the Federal Government pays at least half of the administrative cost and from one-third to one-half of the actual outlay for all of the programs except unemployment compensation. Unemployment benefits are financed by taxes on employer or employee, or both, depending on the individual state law.

Operation of the Social Security Act since it became law Aug. 14, 1935, up to Nov. 1, 1938, cost the Federal Government $1,432,000,000 in round figures. Roughly, industry pays somewhat more than half these costs; most of the remainder is paid by employees. It should be pointed out, however, that not all of this money has actually been expended; $793,000,000 had been deposited in the old age reserve account to pay off old age insurance as it becomes due. To offset this outlay the Government has taken in approximately $1,029,945,753 during the same period in Social Security taxes.

Direct administrative expense of operating the Social Security Act is not expected to increase to any major extent in the next year or two. Large expenditures were encountered in the first two years of operation because machinery had to be set up and some 22,000,000 accounts had to be prepared. The board's operating expense for the 1937-38 year was $19,958,477 and for the present fiscal year the Congress appropriated $22,700,000. This is to meet the salaries of a staff of some 10,000 employees, about three-fourths of whom are handling the old-age insurance program. The board incidentally is handling two claims every minute of the working day—about 700 claims during a 7 hr. working day.

TAXES: The undistributed profits tax expected to stand with opposition to increases; prospective abolition of tax exemption privilege from future Federal securities and taxation of Federal and state government employees; probable separate taxation for national defense; re-enactment of expiring excise taxes, leaving a major overhauling of the tax structure to the next session; no incentive taxation to promote profit sharing at present session

of Congress, if at all, in view of strong organized labor opposition.

LABOR: New Deal will oppose any broad amendment to National Labor Relations Act, but determined drive which it may have difficulty in resisting will be made to bring about wide changes, with Republicans and "yes-but" Democrats leading the move. The New Deal is on the defensive for first time as the result of election returns, especially from Michigan, where his sufferance of the CIO sit-down strikes defeated Gov. Frank Murphy for reelection, and in Pennsylvania where CIO carried only four counties. Effort to revise the Wagner Act will come up with the AFL fight on Senate confirmation of Donald Wakefield Smith of NLRB for reappointment. AFL wants act revised to compel by law recognition of craft union elections, rather than leaving the matter to the discretion of NLRB, which the Federation has bitterly attacked as being CIO-biased. Business wants to bar coercion, "whatever its source." A move will be made to separate the prosecuting and the judicial functions of the board.

WALSH-HEALEY ACT: Two proposals were made last session to broaden the Walsh-Healey public contracts act and the attempt is expected to be repeated: (1) Holders of contracts valued at $2,000 (instead of the $10,000 at present) would be covered by the minimum labor standards laid down by the Public Contracts Board; and (2) firms classified as persistent violators of the Wagner Act would be blacklisted and denied Government contracts. Both were incorporated last session in a bill pushed by the CIO, but it was lost in the legislative log-jam after William Green, AFL president, registered opposition because he feared it would broaden the labor board's powers to discriminate against AFL unions.

The Labor Department has for several years favored broadening of the law, and the AFL favors the step if the Labor Board's powers are not increased. While the chances for securing passage of the $2,000 contract minimum are fair, the CIO's loss of political power manifest in the November elections may preclude the possibility of broadening the law to blacklist Wagner Act violators. The expected opposition from the War and Navy Departments, which always have voiced opposition to any moves increasing the difficulties of Government contractors, should be enough to squash any further attempts in view of the right-of-way to be given the rearmament program.

WAGE-HOUR: The possibilities of any substantial revision of the new wage-hour law are remote. Several have expressed the view that the law is not perfect, including Administrator Andrews and AFL President William Green, but at least during the new session the predominant argument is expected to be that it is too early to suggest changes since the law has yet to be given a real workout. Andrews has, however, uncovered a few administrative wrinkles which he may seek to correct. These include several provisions of the law against which Andrews feels penalty provisions should be applicable. For example, Section 18 provides that no section of the law "shall justify" any employer in reducing above-the-minimum-wages down to the prescribed minimum but

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it is conceded that no enforcement teeth are provided to make the provision effective.

Also, there is the exemption from the requirement that all overtime be paid for at the rate of time-and-one-half which is applicable where overtime work is allowed in an agreement between employer and employee. But the agreement, the law stipulates, must be bona fide and the act delegates authority to the National Labor Relations Board to determine which agreements are, in fact, bona fide. This power was delegated to the NLRB without providing the board with facilities to handle such certifications and until the law can be revised, the exemptions are not being allowed.

SENATE CIVIL LIBERTIES COMMITTEE: Headed by Senator LaFollette, this committee chose as one of its chief targets for flagellation steel companies struck by CIO and legislation it will recommend with probable White House support is said to contemplate: (a) Interstate regulation of certain industrial practices; (b) barring of use of tear gas or machine guns in labor disputes; (c) revision of National Labor Relations Act to make it an unfair labor practice for employers to hire so-called spies, assumption by them of police powers, or purchase of arms other than those needed for regular protection of company property; (d) denial of Government contracts to corporations held to have engaged in unfair labor practices.

ROBINSON-PATMAN ACT: The Federal Trade Commission has not asked for any amendment to this measure and apparently for the present there is no concerted pressure from other sources for its revision. The FTC has fared well in court tests, which have centered on the brokerage section. To the iron and steel industry the greatest interest in the act lies in its use by the FTC to attack the basing point system. In attacking this system in the cast iron soil pipe, cement, and corn products industries, the FTC charged violation of the Robinson-Patman Act through alleged price discrimination among buyers.

RELIEF: Politics in relief was a big issue in campaign and gives reinforced strength to move, with doubtful outcome, to earmark appropriations for distribution under supervision of bi-partisan state boards rather than continuing centralized power in hands of WPA in Washington.

PWA: Administration will seek to make this spending agency permanent. Its failure, except to provide temporary shot-in-the-arm stimulus to recovery, and charges of political use of funds, indicates Congress, if it continues the agency, will demand large control over expenditures.

REORGANIZATION: Indications are that the President, if reorganization is to be endorsed, will have to compromise and cooperate with such reorganization advocates as Senator Byrd, Democrat of Virginia, who wants to bar executive control over independent bureaus. Like others he wants also to put through a bill that will mean savings to the Government by knocking out numerous alphabetical soup agencies, whose only use has been political.

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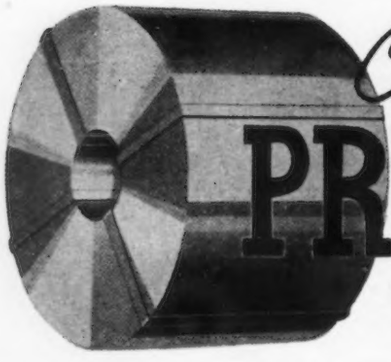


Cold Rolled
PRECISION
STRIP STEEL

Labor Relations

(CONTINUED FROM PAGE 104)

largely through the Labor Board. Regardless of elections, or storm signals raised against the spread of radicalism in the nation, the CIO still feels it can count on the New Deal, perhaps at times direct it. Not long ago Mr. Philip Murray, Lewis' chief assistant, assured his followers in the SWOC that everything would turn out all right in the union's efforts to lift minimum wages in some areas for steel firms bidding on Government purchases.

"After affected companies present appeals, which may involve some delay, Secretary of Labor Frances Perkins will issue an order putting these wage rates into effect on Government contracts," said Mr. Murray confidently.

Efforts during 1938 to reunite the AFL and CIO are certain to be continued in 1939 with dimming chances of success. Late in 1938 Mr. Green said, "The American public is sick and tired of the tactics and philosophy of the CIO." The federation declared that "in view of the recognized desire of working men and women for a united labor movement, it is important to reiterate the indisputable fact that John L. Lewis, chairman of the CIO, originally established by a secession group to overthrow majority rule and democratic procedure in the AFL, was solely responsible for wrecking the peace conference in Washington last December between two committees representing, respectively, the AFL and CIO.

"The destroying chairman of the CIO, with a ruthlessness combining the democracy-destroying and malevolent totalitarian autocracies ruled by Stalin, Hitler and Mussolini, irrevocably vetoed the agreement reached by representatives of his CIO unions with representatives of the AFL and decreed that the conferees must swallow his undemocratic and un-American scheme bait, line and sinker."

Mr. Lewis Answers

On a similar plane of restraint, Mr. Lewis said: "The CIO accepts the goal of unity in the labor movement. . . . We are not willing, however, to make of the CIO another Czechoslovakia to be dismembered and destroyed by such powers as seek peace at our expense."

As the two branches of organized labor try in vain to reconcile their growing differences, employers in many fields study regularization of employment, guaranteed annual wages, profit-sharing plans and other steps which may be taken to level off the peaks and valleys of business and employment.

One of the largest steel companies has been quietly conducting an experiment toward stabilization of employment in one of its divisions for several months and is studying the results. Production and employment curves over a period of years were averaged to provide a basis for the number of men to be employed. In lean months, the product of the division was partly finished, then stocked until demand picked up, at which time the finishing operations were performed. Already many obstacles have been encountered but some have been removed and this company, and industry generally, feels more hopeful than a year ago that its relationships with its employees, whether organized or not, are on the threshold of further improvement.

THE warehouse gang used to handle every sack of frit (raw material for porcelain enamel) by hand, to and from piles 15 feet high. This was the hardest kind of labor and produced clouds of chemical dust which settled all through the plant.

Now a 3-ton Northern Crane handles U-shaped pallets, each carrying two tons of frit as a unit. There is no more heavy lifting, no dust, no more broken sacks at the bottom of the high pile, and movement to and from storage is very much faster.

Let Northern engineers study your handling problems.

NORTHERN ENGINEERING WORKS, ***Detroit, Michigan***

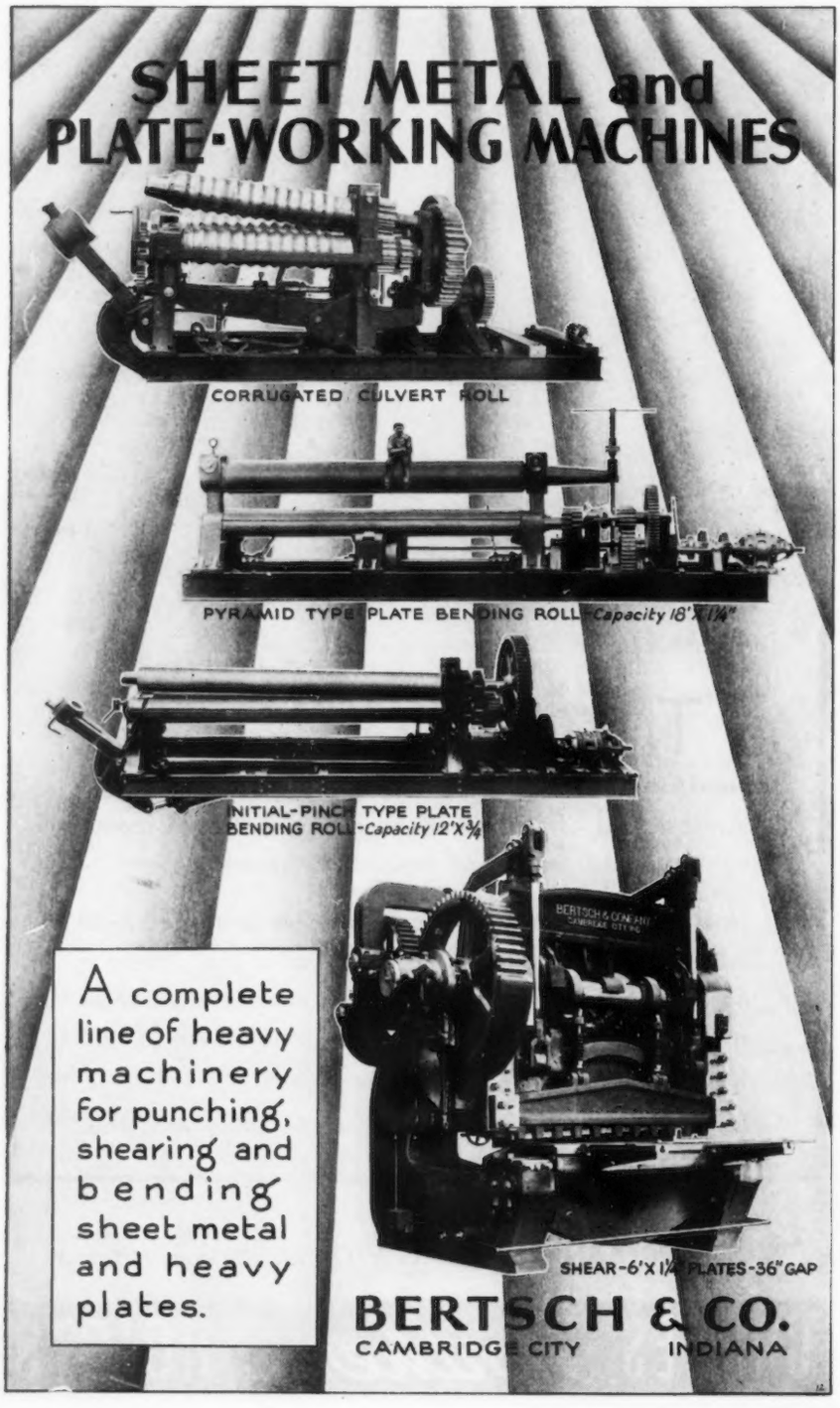
CRANES *Northern* HOISTS

Steel Prices and Production

(CONTINUED FROM PAGE 110)

place tonnage at the cut prices, and thereby resulted the largest buying of sheets and strip the market had experienced since the early part of 1937. This business helped considerably to sustain operations at fairly good level during November and December.

The continuance of fourth quarter prices into the first quarter of 1939 ran counter to the desire of the industry to obtain a better profit margin, but market conditions at the end of the year were not propitious for an advance. During the latter half of the year the general price was below normal, considering the higher costs brought about by wage advances in November, 1936, and March, 1937. The 10-year average of THE IRON AGE finished steel composite price for the period 1928 to 1937, inclusive, is 2.079c. a lb., or $41.58 a net ton. At the end of 1938 THE IRON AGE composite price was 2.286c. a lb., or $45.72 a net ton, only $4.14 a ton higher, although labor costs are considered to be roughly 20 per cent higher.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Pig Iron and Scrap Prices

Pig iron prices pursued a less erratic course than steel prices during the year. Domestic pig iron prices were fairly steady during the first half of the year, but were reduced $4 a ton for the third quarter, this reduction coinciding with the sharp decrease in steel prices announced in the last week of June. In late September an advance of $1 a ton was announced, but not much iron was shipped at the new price as most users covered their requirements prior to the effective date of the increase. THE IRON AGE pig iron composite price stood at $23.25 until late June, dropped to $19.61 for July and August and the first three weeks of September, then rose to $20.61, where it remained at the year end.

Steel scrap prices fluctuated within a range of $4 a ton, reaching the highest point of the year in November, when THE IRON AGE composite price was $15. They were fairly strong in January at an average of $14, but in February a period of progressive weakness set in when steel production failed to show its customary upward trend of the late winter and spring months. The decline reached bottom in June at a composite price of $11. Just before the steel industry slashed prices the scrap market took on a stronger tone, reaching a secondary peak for the year of $14.83 (composite price) early in August. This advance did not hold, however, and the market was somewhat irregular and lower until late October, when a fresh rise occurred. Between the end of October and the third week of November prices had risen an average of 83c. a ton, followed by another period of slight weakness in December. The fluctuations in scrap prices, while influenced to some extent by the domestic situation, were also the result of export sales. While scrap shipments during the year dropped about 30 per cent below those of 1937, they were still of sufficient importance to exert a marked effect on prices. Scrap did not fall to

the low figures of other depression years.

Scrap exports in 1938 are estimated at 2,800,000 tons, or about 1,239,000 tons below the all-time high total of 4,039,257 tons in 1937. Imports of scrap also slumped from 451,520 tons in 1937 to an estimated 135,000 tons in 1938. Reflecting her war activities, Japan was the largest buyer of American scrap last year just as she was in 1937.

Export Shipments Lower

Iron and steel exports, exclusive of scrap, in 1938 declined sharply from the 1937 totals. Exports of pig iron and steel (ingots, semi-finished and finished) in 1938 are estimated at 2,175,000 gross tons, a drop of 38 per cent from those of 1937, which amounted to 3,475,257 tons.

Japan was the largest buyer of pig iron and steel as well as of scrap, her purchases of these commodities totaling about 500,000 tons, of which pig iron was about 275,000 tons and ingots, billets, etc., about 100,000 tons. Japan's takings of iron and steel from the United States, however, were 43 per cent below the 879,652 tons bought here in 1937. Canada was the second largest buyer last year, taking about 240,000 tons of a wide range of products, such as bars, plates, shapes and sheets. Canada's purchases here in 1937 were 456,599 tons. Other principal buyers of American steel, named in the order of their purchasing importance, were Kwantung, Philippine Islands, Venezuela, The Netherlands, Brazil, Colombia and Chile.

The nine major products, exclusive of scrap, exported in 1938 and estimated outgoing tonnages, with 1937 totals in parentheses, were: Pig iron, 433,846 (782,436); plates, 211,438 (386,820); black steel sheets, 184,542 (286,231); ingots, etc., 155,583 (338,722); steel bars, 136,000 (139,135); shapes, 112,152 (214,835); wrought iron and steel pipe, 98,000 (142,391); wire, 90,000 (101,216); rails, 88,000 (148,182). The estimated total for 1938 shipments of these products is 1,500,000 tons compared with 2,539,968 tons shipped in 1937.

Exports of scrap to Japan last year were about 1,258,000 tons, or 44 per cent of 1,904,768 tons that country took in 1937. The second largest buyer of American scrap last year was the United Kingdom with shipments approximating 469,712 tons compared with 845,216 tons in the preceding year. Estimated exports of scrap to other countries in 1938, with 1937 totals in parentheses, were: Italy, 338,890 (381,394); Germany, 221,818 (88,153); The Netherlands, 199,965 (143,401); and Poland, 149,302 (275,337).

Pig Iron Imports Drop

The sharpest drop in imports last year was in pig iron which fell to around 35,000 tons from 95,908 tons in 1937. This product was the largest item of importation in 1937. In 1938 pig iron and structural steel imports totaled about the same. India and The Netherlands were the chief sources of pig iron imports while Belgium supplied the largest incoming shipments of structural shapes.

Machinery Exports Higher

Marked by sharp increases in purchases by Russia and Japan, exports of power-driven metal working machinery in the first 10 months of 1938 rose to a value of $46,694,810 from $12,612,137 in the corresponding period

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of 1937. Exports of all industrial machinery also showed a substantial gain in 10-month period of last year over the January-October period of the preceding year with respective totals of $225,981,992 and $195,999,972.

Russia's purchases of power-driven metal working machinery in the 10 months of 1938 shot up to $27,153,511 from $4,593,505 in the same period of 1937, while Japanese purchases increased to $19,541,299. The other chief purchasing country of this class of machinery was the United Kingdom, but it reduced its orders in the 1938 10-month period to $12,306,330 from $16,030,757 in the corresponding period of 1937.

The chief power-driven metal working machinery items exported in the first 10 months of 1938, and their value in round figures were: Lathes, $12,400,000; milling machines, $11,600,000; grinding machines, $9,500,000; rolling mill machinery, $8,000,000; sheet and plate working machines, $6,000,000; drilling machines, $3,000,000; planers and shapers, $2,000,000.

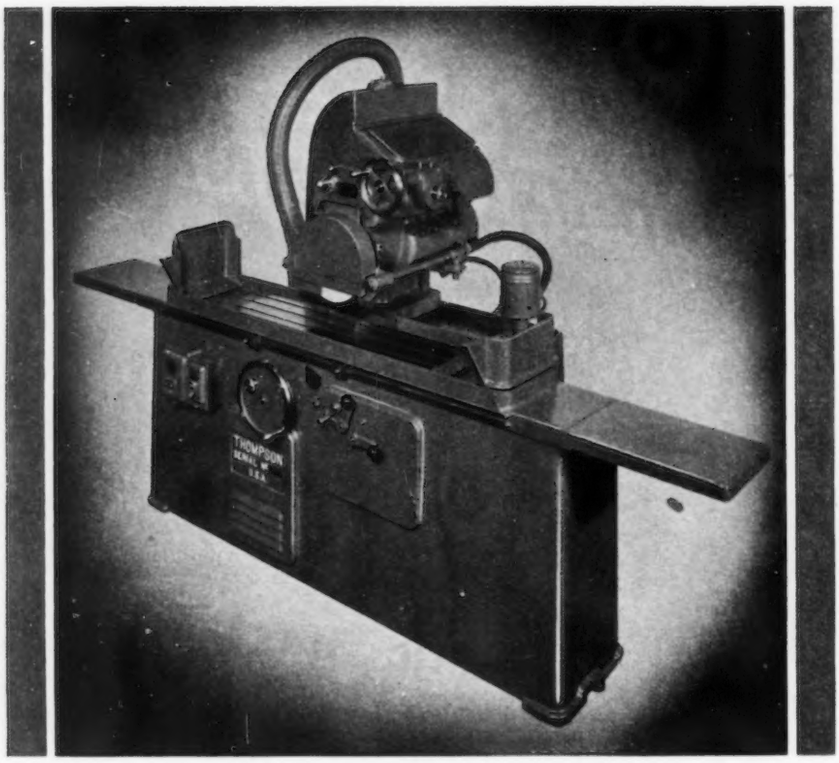
Ore Shipments Lowest Since '32

Lake Superior ore shipments were the smallest since 1932. Confronted last May with abnormally large stocks of Lake Superior iron ore at furnaces and Lake Erie docks, producers and shippers anticipated only a very light movement during 1938. However, consumption and shipments finally proved slightly better than had been expected at the start of the season. Lake shipments totaled 19,263,011 gross tons and the all-rail movement approximated 300,000 tons, making total shipments about 19,563,000 gross tons, the lowest amount shipped since 1932. Consumption by blast furnaces was approximately 24,000,000 tons.

Stocks next spring will be closer to normal than they were in 1938, but will still be on the high side. Contrasted with the 33,676,333 gross tons held last May 1, it is expected that roughly 23,000,000 tons may be on hand at the start of the 1939 season if consumption follows present indications.

At docks and furnaces on Dec. 1 were approximately 40,000,000 tons compared with 42,000,006 tons on Dec. 1, 1937. Estimates of the probable 1939 movement range around 39,000,000 tons. Numerous mines in November stepped up their schedules for the winter to three and four days per week.

Ore reserves of the Lake Superior district are ample for many years to come, particularly from the enormous bodies of low grade material which ultimately will be mined and concentrated. Already about 40 per cent of the ore shipped receives some kind of treatment or processing and research is directed continuously toward improving the practice of beneficiating low grade ores.



FAST PRECISION GRINDING

Since the speed of precision grinding depends on time needed to re-dress the wheel, hardness of wheel, table speed, rate of feed, material worked on and operating skill, many large shops have found it profitable to use

THOMPSON HYDRAULIC GRINDERS

An automatic truing tool on Thompson Hydraulic Grinders diamond dresses the wheel instantaneously before each cut. Harder wheels can be used with faster table speeds and feeds. Virtually 100% automatic . . . and safe to operate.

TRUE WHEEL AUTOMATICALLY

Automatic wheel truing, exclusive with Thompson, keeps the wheel always in prime condition. Produces better work faster. That's why progressive shops use Thompson Hydraulics. Write for details.

THE THOMPSON GRINDER COMPANY
SPRINGFIELD, OHIO

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Trends in Metal Cutting

(CONTINUED FROM PAGE 120)

Co. under license of the Chrysler Corp. were special-purpose in character. Norton Co. and the Cincinnati Milling Machine & Cincinnati Grinders, Inc., have since been licensed to make Superfinishing machines also. The year to come will see other special-purpose types for automotive

parts heretofore not so processed. Other immediate fields of application will be the aircraft industry, where wear of engine parts is a major problem; the antifriction bearing industry, and rolls of all kinds. In fact, a Superfinishing attachment for a grinder is now being built to finish cylinder rolls 17 ft. in diameter, used in chemical film manufacture. Foster is now ready to offer a general-purpose toolroom machine capable of swinging work up to 4 in. diameter and 18 in. long, also a larger cylindrical machine capable of taking work up to 50 in. long, the toolroom machine has an optional attachment for flat Superfinishing. These units offer the first step in the general application of the technique.

Trends in Cutting Materials

The most important occurrence in the cemented carbide field during 1938 has been the progress made in cutting steels, particularly finish machining. Many complicated cemented carbide tool set-ups have been made for the machining of precision steel forgings in which it is necessary to remove only a minimum amount of stock. Recognition is now being made of the fact that success of these applications largely hinges upon proper design of the tools and the method of holding them. Heretofore the tendency has been to overemphasize the cemented carbide itself as the determining factor instead of tool design and application. This does not mean that further grade development of carbides has been side-tracked, but their development has become of lesser importance, now that the possibilities of existing materials when properly mounted become better known.

The scope of tantalum-tungsten carbide has been broadened up and down the scale of critical cutting speeds, resulting in the closing of some wide gaps in carbide coverage. These developments should be followed in the near future by a wider range of use of these carbides on such materials as semi-steel and other iron and nonferrous alloys. The application of steel cutting grades of carbides to the newer alloy cast irons of low carbon content is also interesting to note. Stellite J metal and 2400 metal are other hard metals that are being used in the form of cutting tools for machining many of the recently developed tough alloy steels.

Another noticeable trend in carbide application is to a wider variety of tools each year, particularly in 1938. Preforming of carbide blanks in the soft is being steadily improved, and industry has been quick to take advantage of the lower cost of using standardized shapes of blanks in making up their own tools by brazing onto various shanks.

Use of cemented carbides as a wear resisting material is steadily going forward. Tremendous increase in the life of plug, ring and snap gages is possible with carbide wearing members on the contact surfaces. So, too, there is a growing use of the hard alloys for the indicator points of visual gages. The use of carbide tipped thread gages is increasing. Carbides are also being used to reduce wear on localized areas of machine parts, such as cams, dogs, trips, chip breakers and chip deflectors. Cast cobalt-chromium-tungsten alloys are similarly being used for wear strips on boring bars, for chuck jaws, collet inserts and wear plates in general.

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FABRICATING MACHINERY

Materials and Metallurgy

(CONTINUED FROM PAGE 132)

tering internal and/or external characteristics, has long been a volatile division of the industry. New materials and improved methods follow each other so regularly that often the wide influence of such changes fail to receive commensurate attention.

The next year should show the popularization of a different heat treatment for black (tin) plate, the purpose being to increase stiffness without excessive reduction in ductility. Thereby, cans can be made of lighter plate, without increasing susceptibility to denting, etc. This plate already has been developed and put through numerous tests, and apparently will soon emerge from the laboratory to take its place in the industrial picture.

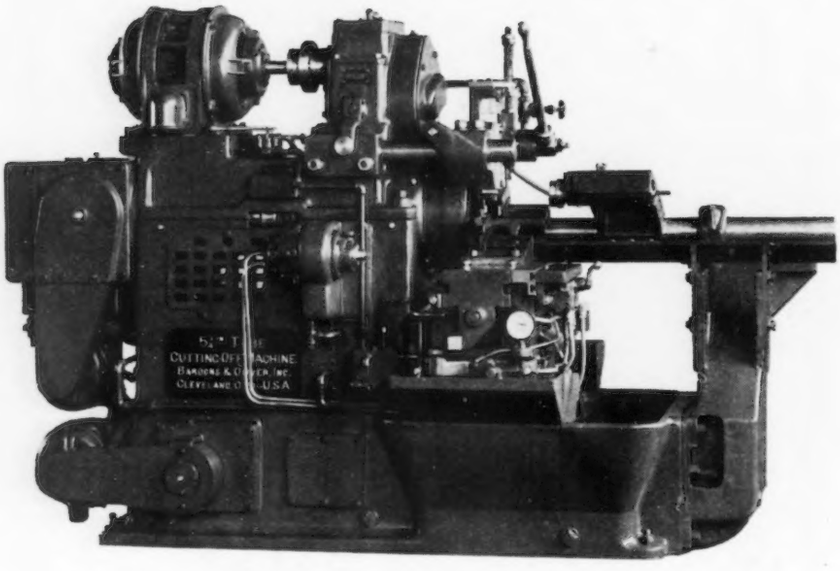
Tin plate also has other developments overhanging its future. It goes without saying, of course, that tin plate is far from a perfect container material, but it is not so generally recognized that the tin coating on the plate serves in many instances no health purpose, but rather facilitates the soldering of cans and the fancy lithographing of the exterior. If satisfactory speedy welding equipment could be perfected, it would be perfectly feasible to construct cans for certain purposes out of plain steel, protected by suitable lacquers. Such development work has long been under way, and much success has already attended the efforts. The year 1939 should see more on this subject brought from under wraps.

Similarly, for many uses now dominated by tin plate, it would be equally as suitable, and perhaps cheaper and more satisfactory to use aluminum coated steel. This possible development frequently shows its head, but has just as frequently been knocked down by technical imperfections or excessive cost. The next year, however, should see it again prominently in the technical news, as a company is being formed, with prominent principals and a probable alliance in the tin plate industry, for its exclusive manufacture. Only in the form of dipped sheet could aluminum plate compete at the moment with tin plate. Clad sheet, even though it has often been produced in Germany and elsewhere, is still far from available in a suitable form which can compare with tin plate. A hot dipped product has been devised by several researchers, but even under the best of conditions the product is usually found to have a thick interfacial alloy, which is quite brittle. For aluminum this alloy has been 25 times or so as thick as in tin plate, and usually has been an effective bar for high speed can making.

The new company, however, promises a thinner interfacial alloy, and a product well able to be fabricated into many kinds of cans, bottle tops, etc. It is true, also, that in food containers aluminum plate would require lacquering even as tin plate, despite statements to the contrary. Therefore, possible monetary advantage would be derived from the aluminum-tin price differential and the releasing of the industry from foreign supplies of tin.

Added together the pros and cons

CUTTING-OFF MACHINES
FOR TUBING & SOLID BARS



FULL AUTOMATIC
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A COMPLETE LINE
FROM 1" TO 26" CAPACITY

BARDONS & OLIVER, Inc.
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TURRET LATHES & CUTTING-OFF MACHINES

indicate the likelihood of a final useful aluminum coated steel as a standard sales item, enjoying favor for many uses, but requiring probably many years of study and additional develoment before standing as a serious threat to tin plate as a wet pack food container.

Investigations are under way as to the suitability of silver as a coating material for steel. Bureau of Standards tests have shown the resistance of such a silver plate to a variety of corrosive substances so high as to promise a possible limited future in the handling of foodstuffs, beverages and chemicals. Work is going on to produce impervious thin silver coatings offering a maximum of protection at a minimum cost. This material of course will probably find a limited place as a quality product where very favorable performance will offset relatively high initial cost.

In any discussion of tin plate it is always advisable to look into the possibility of the development of a competitive plastic substance for food containers. Such plastics of questionable worth have been made in Germany, and can barrels have been made of the substance, employing conventional tin plate ends. The contents were thereby visible and so had a definite sales appeal, but manufacturing economy as well as chemical stability are doubtful. Nonetheless, there is always a potential threat to tin plate in such a material, and it of course is obvious that success in such a direction could raise havoc with the huge investments in tin plate manufacture. That plastics are potientially capable of such a dramatic development is demonstrated by the recent German plastic used for making collapsible tubes on a commercial scale by Hafta Handelsgesellschaft for Technische Neuheiten, m.b.H., Berlin.

The tubes are provided with heads (upon which the closing caps are screwed) made of plastic material and the caps themselves are likewise made of plastic. It is understood that a variety of plastic material can be used for the heads and caps but that apparently the material now used for the heads is a carbamide (urea) synthetic resin and that used for the caps is poly vinyl chloride. However, the exact character of these plastic materials is of subordinate importance.

There were two main problems involved in producing the tubes and which previously had baffled all the research efforts of chemists concerned with the task of perfecting a plastic tube, namely, (a) the development of a suitable film for covering the cellophane casing and (b) the firm attaching of the tube-head to the tube-body. It appears that both of these basic problems have now been effectively solved for the first time in the new tube. It seems that an important achievement was represented especially by the development of a suitable resinous material that would remain permanently adhered to the cellophane casing.

The film casing is transparent, thus rendering the contents visible and enhancing their marketability. However, the tube casing can be covered with an outer-covering of opaque metal or other foil, or the casing itself may be printed in any manner desired, so that a wider variety of decorations of the tube and advertising effects can be achieved.

The plastic tube is of feather-weight lightness, having only one-fifth the weight of tin-lead tubes. This lightness of weight enables considerable

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Complete HEATING EQUIPMENT *for making*
300 Knee Action Coil Springs per Hour

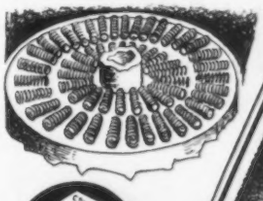
1 First operation is heating in the "Salem" Rod Heating Furnace (oil fired). From the charging door rods roll by gravity down the inclined hearth to discharge door. Capacity of furnace 300 rods per hour.

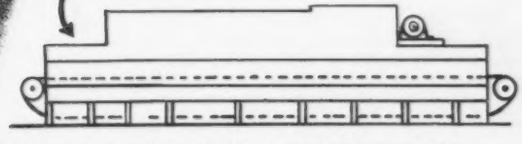
2 Second is the coiling operation. The furnace keeps plenty of rods supplied. Coiler can be seen in illustration above, to the right at rear of furnace.

3 Third, the hardening operation in a "Salem" oil fired Rotary Hearth Hardening Furnace. Furnace employs the advantages of the rotary hearth principle and is designed so there is no flame impingement. Coils are loaded as shown below, for forced production two deep and two high on special carriers.

4 Fourth, the quench where jigs and manual operation are required to prevent warpage and distortion.

5 Fifth, the "Salem" Draw Furnace, oil fired, convection heated, continuous mesh belt conveyor. This draw furnace is of special design.





YOUR heating problems in ferrous or non-ferrous metals production will find their answer in a "Salem" solution. A qualified representative will be glad to talk with you—no obligation.

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SALEM ENGINEERING COMPANY

savings in transportation and other costs.

The plastic tubes are claimed to be unbreakable and undentable so that the unusual care in packing them in the unfilled state, as is necessary in the case of metal tubes, can be dispensed with, with corresponding savings in charges for labor, packing materials, freight, etc., in shipping the tubes from the place of manufacture to the filling utilizing plant.

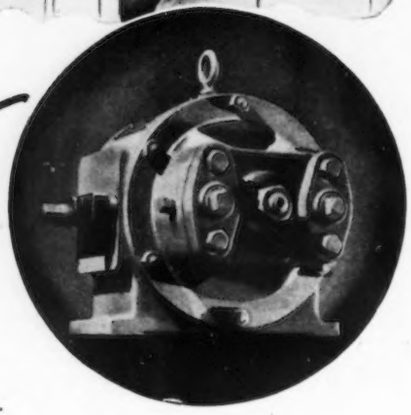
The plastic tubes are said to greatly exceed metal tubes in flexibility and toughness and therefore there are no breaks in the casing due to rolling, creasing, tearing, etc., as are likely to occur in the case of metal tubes.

The tubes are especially useful in very large sizes of up to 500 ccm. contents which would be quite impractical in the case of metal tubes owing to the prohibitively large amount of metal required, the resultant high cost of the metal tubes, the stiffness of the metal required for such large containers and the difficulties of folding or rolling such heavy metal tubes. It is believed that a particularly promising field of application awaits the new plastic tubes in very large sizes for containing all manner of industrial materials, oils, fats, chemical compositions, etc., for which very large size metal tubes have not been available heretofore.

Colored Steel

In the surface treatment of steel, a glance into the far future would indicate reliable methods of coloring steel, thereby making available steel having maximum functional characteristics. By coloring is not meant the painting or lacquering or even the electroplating of colored films on steel surfaces, but rather a surface treatment or an alloying treatment producing color effects completely a part of the steel structure. Such material would have such far-flung advantages as to need no great discussion. Automobiles would have a permanent surface color unaffected by mishaps and the ravages of time, architectural treatments would be countless and of intricate variety, particularly in external and mildly corrosive applications. And the great mass of consumer products would acquire permanency and a possible lowering in cost.

Little attention has been directed toward the subject of colored steel. In fact the thought is so fantastic as to discourage much expert attention on the part of prominent metallurgists. Even with this widespread attitude, however, several procedures for coloring stainless steel have been developed, and though additional development work will be required, present results are most promising in that a variety of rich colors are available, the coloring is comparatively permanent in character despite it being a surface effect, the colored material can successfully withstand fabricating operations, and the practice is not excessively costly. Very occasionally the results of experiments in Europe for an equivalent technique for ordinary steel come to light, and even more rarely there are discussions of the problem in this country. In most instances the problem is treated as a surface effect, but in addition the possibility has been broached that internal coloring could be secured through alloying with highly colored non-ferrous metals. The problem would be to secure such coloring through alloying without seriously impairing the physical properties of the steel.



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Self-Reliant

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Hele-Shaw Fluid Power is oil under pressure. Literally—Hele-Shaw Pumps take care of themselves. Running smoothly in a bath of oil, they are self-lubricating, constantly operating with immediate and automatic adjustment to any cycle of changing speeds, pressures, or direction.

Self reliance is *one* reason why so many machine designers, builders and buyers are specifying Hele-Shaw Fluid Power.

But there are other equally important reasons. Hele-Shaw Fluid Power increases production by instant and automatic adjustment to operating conditions. It offers wide flexibility of location. It sustains its pressures with a minimum loss of energy.

Write us for complete details. Ask us to show you how Hele-Shaw Fluid Power can be advantageously applied to the machinery you design, build, or buy. Specify Hele-Shaw.

A-E-CO
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A-E-CO Hele-Shaw FLUID POWER

OTHER A-E-CO PRODUCTS: Lo-Head Hoists, Taylor Stoker Units, Marine Deck Auxiliaries.

AMERICAN ENGINEERING COMPANY

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To impart to steel added adaptability to the demands of consuming operations, the near future will of course display additional advances In the art of differential hardening. The flexibility of flame hardening even today has made it an established and highly useful practice. Additional adaptations of the process are scheduled for the coming year. More widespread use of heavy metal carbides for coating machine elements required to resist heavy wear is seemingly inevitable, and there is considerable possibility that much of this type of work hitherto carried out by brazing or spot welding in the carbide inserts may be duplicated in foundry practice.

There are indications that equivalent results may be secured on the foundry pouring floor, being similar to duplex casting in that a single mold is used and the carbide material is introduced in powder form and is not cast to shape. The procedure consists of making a heat resisting mold of the shape of the finished article. The portions that have to be made hard are separated from the rest of the mold by metal gauze or perforated metal sheet and carbide powder is packed into the spaces. In complicated parts pre-sintered carbide inserts may replace the carbide powder. The remainder of the mold is then cast full of a suitable basis metal, either iron, steel or perhaps some non-ferrous metal, and the molten metal penetrates the carbide powder and cements it into place. The result is a single casting with the surface reinforced in selected places by a high concentration of hard carbide material. Such a method may be used in producing drawing mandrels and dies, and perhaps even the production of tools such as milling cutters.

Variable Voltage Conveyor Equipment Obviates Ripples In Brass Castings

THE problem of preventing ripples on the tops of brass castings poured in molds on a conveyor was solved by the introduction of a variable-voltage equipment for driving the conveyor, according to the General Electric review of 1938 developments in the electrical industry. The conveyor belt moves intermittently while the molds are filled from the cupola, and ripples in the castings would result if the molds were jerked; variable-voltage equipment with damping-motor control of acceleration and deceleration assures smooth starting and stopping, and smooth castings.

Plug-in Instrument Field Extended

DETACHABLE instruments were much emphasized a year ago. But it is the work of instrument men culminating last year that gives this forward step the fullest practical meaning to instrument users across the broad plains of industry, according to the Westinghouse Electric & Mfg. Co.

The capacities of socket-type ammeters and voltmeters have been greatly stepped up. Upper scale limits of plug-in ammeters have been increased from 15 to 20 amp. to 125; voltmeters from 115 to 750 volts. This seemingly obvious step—but not so simple of accomplishment—widens materially the potential field of detachable instrument application. The usefulness of the detachable instrument idea has been greatly augmented, it is said, by the addition of a new, highly-convenient recorder for socket mounting. The same simplified recorder is also built for switchboard mounting and for portable use.

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Constant development and research by Stearns engineers, together with extensive laboratory facilities, has been responsible for much of the present day widespread industrial use of magnetic equipment.

Stearns products will solve your problem, whether for separation, protection, purification, reclamation, power transmission and control or special magnetic appliances. You can depend on Stearns for high maximum operating efficiency at low cost.

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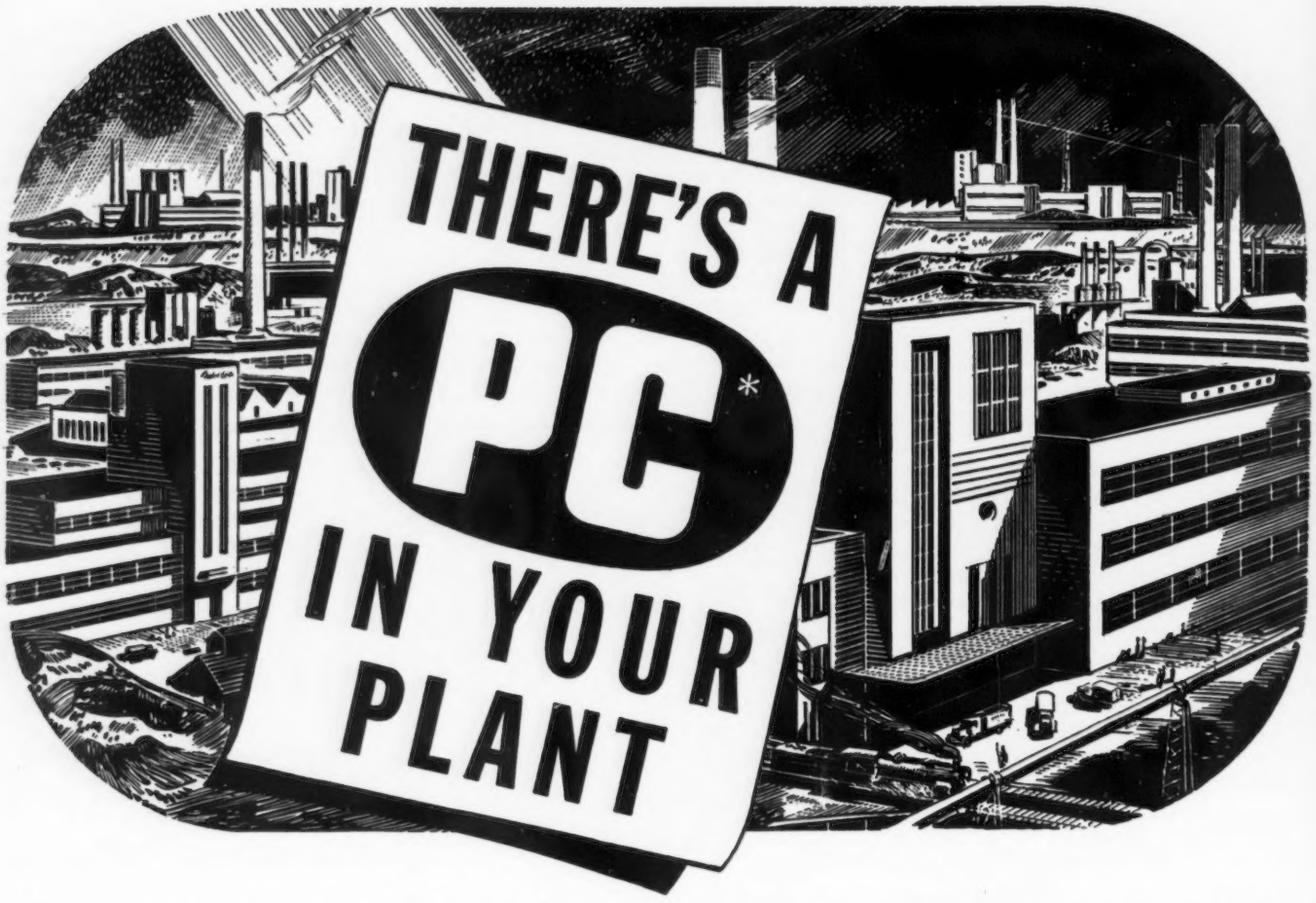
LARGEST EXCLUSIVE BUILDERS
OF MAGNETIC EQUIPMENT



Recognize him..give him authority..put him on overtime

● Many executives are finding that they already have in their organizations the answer to their prayers for *lower costs* and *more business.* They are making this discovery by recognizing and giving executive authority to the PROFIT CRUSADER in their plants.

You, too, probably have a PROFIT CRUSADER in your

organization who will enable you to speed up the wheels of business, to provide more jobs, better earnings and more profit for everybody.

You will know this PROFIT CRUSADER by these signs: (1) He has a deep-seated faith in the ability of arc welding to cut costs and improve product quality. (2) He has the perseverance and the irresistible drive necessary for leadership against the forces of Tradition. (3) He has experience in design and production.

Capitalize on the zeal, initiative and ability of this ardent driver for profits! Recognize him and then, of most importance, give him executive authority to get results.

Let us show you how other companies have profited by this plan. For counsel in reorganizing along these lines, call the nearest Lincoln office. Have your secretary write for the book of suggestions for the PROFIT CRUSADER. THE LINCOLN ELECTRIC CO., Dept. X-560, Cleveland, Ohio. Largest Manufacturers of Arc Welding Equipment in the World.

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THE LINCOLN ELECTRIC COMPANY

CLEVELAND, OHIO

THE IRON AGE

ANNUAL STATISTICAL SUPPLEMENT

JANUARY 5, 1939

Steel Ingot Production in the United States

(THE IRON AGE *figures prior to June, 1917; American Iron and Steel Institute figures since then, with additions for electric and crucible steel*)

(*Thousands of Gross Tons*)

	Jan.	Feb.	March	April	May	June	Half Year	July	Aug.	Sept.	Oct.	Nov.	Dec.	Second Half	Year
1902	1,223	1,060	1,192	1,256	1,321	1,185	7,237	1,189	1,211	1,209	1,268	1,174	1,268	7,319	14,556
1903	1,217	1,131	1,265	1,322	1,363	1,376	7,674	1,230	1,250	1,277	1,178	822	674	6,431	14,105
1904	759	1,020	1,239	1,325	1,263	1,100	6,706	885	1,001	1,153	1,196	1,262	1,327	6,824	13,530
1905	1,516	1,389	1,710	1,624	1,735	1,576	9,550	1,425	1,629	1,670	1,746	1,770	1,673	9,913	19,463
1906	1,928	1,746	2,018	1,848	1,956	1,833	11,329	1,739	1,794	1,757	2,047	2,029	1,929	11,295	22,624
1907	2,005	1,830	1,949	2,007	2,087	1,944	11,822	1,975	2,046	1,899	2,124	1,654	1,039	10,737	22,559
1908	934	954	1,057	1,023	1,004	972	5,944	1,049	1,171	1,263	1,401	1,350	1,499	7,733	13,677
1909	1,623	1,575	1,722	1,622	1,700	1,801	10,043	1,899	2,030	2,225	2,347	2,376	2,739	13,256	23,299
1910	2,404	2,257	2,506	2,365	2,203	2,157	13,892	1,904	2,016	1,956	1,929	1,818	1,639	11,262	25,154
1911	1,716	1,788	2,199	2,001	1,918	1,801	11,423	1,682	1,951	1,992	2,050	2,015	1,916	11,606	23,029
1912	2,169	2,191	2,441	2,491	2,648	2,461	14,401	2,445	2,648	2,484	2,833	2,759	2,715	15,884	30,285
1913	2,814	2,562	2,679	2,757	2,841	2,532	16,185	2,482	2,466	2,510	2,563	2,151	1,923	14,095	30,280
1914	1,907	1,881	2,287	2,285	2,039	1,930	12,329	1,907	1,944	1,895	1,799	1,470	1,476	10,491	22,820
1915	1,663	1,777	2,226	2,271	2,351	2,555	12,843	2,662	2,887	3,061	3,246	3,259	3,326	18,441	31,284
1916	3,333	3,321	3,627	3,356	3,652	3,473	20,762	3,245	3,481	3,463	3,672	3,581	3,198	20,640	41,402
1917	3,743	3,093	3,864	3,792	4,061	3,617	22,170	3,447	3,663	3,486	3,932	3,714	3,207	21,449	43,619
1918	2,641	2,725	3,728	3,791	3,939	3,696	20,520	3,732	3,696	3,832	4,017	3,668	3,586	22,531	43,051
1919	3,651	3,178	3,128	2,631	2,266	2,607	17,461	2,947	3,226	2,718	2,046	2,513	2,784	16,234	33,695
1920	3,624	3,402	3,917	3,132	3,423	3,539	20,937	3,328	3,562	3,561	3,581	3,133	2,779	19,944	40,881
1921	2,517	1,999	1,795	1,387	1,446	1,146	10,290	918	1,300	1,342	1,847	1,897	1,630	8,934	19,224
1922	1,893	2,071	2,814	2,902	3,219	3,128	16,027	2,953	2,629	2,818	3,410	3,430	3,301	18,541	34,568
1923	3,841	3,472	4,067	3,964	4,216	3,767	23,327	3,531	3,696	3,357	3,577	3,134	2,863	20,159	43,486
1924	3,650	3,826	4,207	3,348	2,640	2,066	19,737	1,878	2,553	2,828	3,125	3,121	3,569	17,074	36,811
1925	4,193	3,752	4,194	3,584	3,455	3,205	22,383	3,084	3,421	3,490	3,889	3,903	3,971	21,758	44,141
1926	4,132	3,785	4,469	4,106	3,928	3,734	24,154	3,635	3,987	3,913	4,074	3,706	3,467	22,782	46,936
1927	3,823	3,845	4,575	4,163	4,083	3,526	24,015	3,232	3,529	3,298	3,345	3,155	3,203	19,762	43,777
1928	4,028	4,081	4,549	4,345	4,246	3,778	25,027	3,841	4,217	4,186	4,693	4,306	4,055	25,298	50,325
1929	4,545	4,372	5,118	4,999	5,339	4,951	29,234	4,898	4,988	4,573	4,579	3,556	2,932	25,526	54,850
1930	3,808	4,067	4,288	4,142	4,014	3,445	23,764	2,945	3,085	2,863	2,714	2,230	1,995	15,831	39,595
1931	2,534	2,570	3,083	2,794	2,574	2,149	15,704	1,907	1,733	1,560	1,605	1,607	1,313	9,725	25,429
1932	1,500	1,496	1,448	1,273	1,137	923	7,777	815	856	1,003	1,099	1,043	871	5,687	13,464
1933	1,030	1,087	910	1,361	2,005	2,599	8,992	3,210	2,905	2,313	2,112	1,540	1,822	13,902	22,894
1934	2,025	2,243	2,836	2,976	3,447	3,102	16,629	1,509	1,399	1,286	1,502	1,633	1,991	9,320	25,949
1935	2,915	2,817	2,910	2,682	2,675	2,294	16,293	2,303	2,962	2,869	3,192	3,200	3,121	17,647	33,940
1936	3,086	3,002	3,384	3,991	4,097	4,035	21,595	3,975	4,247	4,214	4,601	4,389	4,491	25,917	47,512
1937	4,786	4,498	5,303	5,155	5,237	4,254	29,233	4,631	4,958	4,362	3,449	2,189	1,496	21,085	50,318
1938	1,733	1,704	2,012	1,925	1,807	1,638	10,819	1,982	2,547	2,658	3,118	3,572	*3,304	*17,181	*28,000

Monthly Production of Steel Ingots in the United States

(*Per Cent of Capacity*)

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Average for Year
1928	80.33	87.09	90.73	89.49	84.69	77.82	76.78	84.11	86.42	93.60	88.69	81.07	85.05
1929	86.84	92.51	97.80	98.64	102.01	97.70	93.82	95.31	90.44	87.50	70.17	56.15	89.05
1930	71.42	84.47	80.42	80.21	75.29	66.73	55.36	57.86	55.57	50.90	43.18	37.50	63.09
1931	44.75	50.25	54.41	50.90	45.46	39.14	33.70	30.58	28.50	28.33	29.28	23.23	38.13
1932	25.97	27.72	25.07	22.75	19.68	16.49	14.14	14.81	17.96	19.01	18.64	15.09	19.75
1933	17.76	20.76	15.69	24.27	34.52	46.25	55.46	50.02	41.27	36.42	27.44	31.49	33.53
1934	34.33	42.10	48.10	52.11	58.43	54.30	25.66	23.74	22.57	25.47	28.59	33.84	37.38
1935	49.06	52.52	48.98	46.61	45.02	39.87	38.86	49.85	49.99	53.72	55.61	52.66	48.54
1936	52.39	54.53	57.40	69.99	69.58	70.75	67.61	72.11	74.05	78.15	76.94	76.42	68.36
1937	81.32	84.27	89.94	90.25	88.79	74.48	78.48	83.83	76.30	58.31	38.23	25.37	72.38
1938	29.15	31.74	33.85	33.44	30.39	28.46	33.42	42.85	46.28	52.45	62.05	.....	.....

Weekly Production of Steel Ingots in the United States

(*Thousands of Gross Tons*)

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Average for Year
1928	901	977	1,017	1,004	950	873	861	943	969	1,050	995	909	954
1929	1,016	1,082	1,144	1,154	1,193	1,143	1,097	1,115	1,058	1,024	821	657	1,042
1930	853	1,009	960	958	899	797	661	691	664	608	516	448	753
1931	567	637	689	645	576	496	427	388	361	359	371	294	483
1932	335	358	324	294	254	213	183	191	232	245	241	195	255
1933	230	268	203	314	446	598	717	646	533	471	355	407	433
1934	451	553	632	684	767	713	337	312	296	335	375	444	491
1935	648	694	647	616	595	526	513	658	660	709	734	695	641
1936	686	714	753	915	911	927	886	945	970	1,024	1,008	1,001	895
1937	1,065	1,104	1,178	1,182	1,163	975	1,031	1,101	1,002	766	502	333	949
1938	391	426	454	449	408	382	448	575	621	704	833	.....	.....

* THE IRON AGE estimate. Figures for 1938 are preliminary and do not include electric and crucible steel ingots.

Pig Iron Production in the United States

(Thousands of Gross Tons)

(THE IRON AGE figures, including ferroalloys made in blast furnaces, but excluding charcoal iron)

	Jan.	Feb.	March	April	May	June	Half Year	July	Aug.	Sept.	Oct.	Nov.	Dec.	Second Half	Year
1901	1,162	1,134	1,279	1,257	1,339	1,318	7,489	1,360	1,336	1,300	1,382	1,362	1,266	8,006	15,495
1902	1,428	1,258	1,445	1,475	1,543	1,447	8,595	1,442	1,468	1,419	1,481	1,433	1,537	8,780	17,375
1903	1,473	1,391	1,490	1,608	1,714	1,673	9,449	1,546	1,571	1,554	1,426	1,039	847	7,983	17,432
1904	924	1,208	1,451	1,561	1,537	1,296	7,977	1,121	1,173	1,358	1,455	1,487	1,616	8,210	16,187
1905	1,782	1,597	1,936	1,922	1,964	1,793	10,994	1,742	1,844	1,899	2,053	2,014	2,046	11,598	22,592
1906	2,069	1,904	2,165	2,073	2,097	1,977	12,287	2,013	1,927	1,971	2,197	2,188	2,235	12,531	24,818
1907	2,206	2,045	2,226	2,219	2,295	2,235	13,226	2,256	2,250	2,184	2,237	1,828	1,234	12,089	25,315
1908	1,045	1,078	1,228	1,150	1,166	1,092	6,759	1,218	1,360	1,419	1,567	1,578	1,741	8,883	15,642
1909	1,798	1,707	1,836	1,739	1,883	1,931	10,894	2,103	2,249	2,385	2,600	2,547	2,636	14,520	25,414
1910	2,609	2,397	2,618	2,484	2,390	2,265	14,763	2,149	2,107	2,056	2,093	1,910	1,778	12,093	26,856
1911	1,759	1,795	2,171	2,065	1,893	1,788	11,477	1,793	1,927	1,977	2,102	2,000	2,043	11,842	23,313
1912	2,058	2,101	2,405	2,375	2,513	2,441	13,893	2,411	2,512	2,464	2,690	2,631	2,782	15,490	29,383
1913	2,795	2,586	2,764	2,753	2,822	2,629	16,349	2,561	2,546	2,506	2,546	2,233	1,984	14,376	30,725
1914	1,885	1,888	2,348	2,270	2,093	1,918	12,402	1,958	1,995	1,883	1,778	1,518	1,516	10,648	23,050
1915	1,601	1,685	2,064	2,117	2,263	2,381	12,101	2,563	2,780	2,853	3,126	3,037	3,203	17,562	29,663
1916	3,185	3,087	3,339	3,227	3,361	3,211	19,410	3,224	3,204	3,202	3,509	3,312	3,178	19,629	39,040
1917	3,151	2,645	3,252	3,335	3,417	3,270	19,070	3,342	3,248	3,134	3,303	3,206	2,883	19,116	38,186
1918	2,412	2,319	3,213	3,288	3,447	3,324	18,003	3,421	3,389	3,418	3,487	3,354	3,434	20,503	38,506
1919	3,303	2,940	3,090	2,478	2,108	2,115	16,034	2,429	2,743	2,488	1,864	2,392	2,633	14,549	30,583
1920	3,015	2,979	3,376	2,739	2,986	3,044	18,139	3,067	3,147	3,129	3,293	2,935	2,704	18,275	36,414
1921	2,416	1,937	1,596	1,193	1,221	1,065	9,428	865	954	986	1,247	1,415	1,649	7,116	16,544
1922	1,645	1,630	2,036	2,072	2,306	2,361	12,050	2,405	1,816	2,034	2,639	2,849	3,087	14,830	26,880
1923	3,229	2,994	3,524	3,550	3,868	3,676	20,841	3,678	3,450	3,126	3,149	2,894	2,921	19,218	40,059
1924	3,019	3,075	3,466	3,233	2,615	2,026	17,434	1,785	1,887	2,053	2,477	2,510	2,962	13,674	31,108
1925	3,370	3,214	3,564	3,259	2,931	2,674	19,012	2,664	2,705	2,726	3,023	3,023	3,250	17,391	36,403
1926	3,316	2,923	3,442	3,450	3,482	3,235	19,848	3,223	3,201	3,136	3,334	3,237	3,091	19,222	39,070
1927	3,104	2,941	3,483	3,422	3,391	3,090	19,431	2,951	2,947	2,775	2,784	2,648	2,696	16,801	36,232
1928	2,870	2,900	3,200	3,185	3,284	3,082	18,521	3,072	3,137	3,062	3,374	3,302	3,370	19,317	37,838
1929	3,442	3,206	3,714	3,663	3,898	3,717	21,621	3,785	3,756	3,498	3,588	3,181	2,837	20,665	42,286
1930	2,827	2,839	3,246	3,182	3,233	2,934	18,261	2,639	2,524	2,277	2,165	1,867	1,666	13,139	31,399
1931	1,714	1,707	2,032	2,020	1,994	1,639	11,105	1,463	1,281	1,169	1,173	1,103	980	7,170	18,275
1932	972	964	967	852	783	628	5,168	572	520	592	644	631	546	3,518	8,686
1933	569	554	542	624	887	1,265	4,441	1,792	1,833	1,522	1,356	1,085	1,182	8,902	13,213
1934	1,215	1,264	1,620	1,727	2,043	1,930	9,798	1,225	1,054	898	951	957	1,028	6,113	15,911
1935	1,477	1,609	1,770	1,663	1,727	1,553	9,799	1,520	1,761	1,777	1,978	2,066	2,106	11,209	21,008
1936	2,026	1,824	2,040	2,404	2,648	2,586	13,528	2,594	2,712	2,730	2,992	2,947	3,115	17,090	30,618
1937	3,212	2,999	3,459	3,392	3,537	3,108	19,707	3,499	3,606	3,410	2,892	2,007	1,400	16,904	36,611
1938	1,429	1,298	1,453	1,376	1,255	1,062	7,873	1,202	1,494	1,680	2,052	2,270	*2,429	*11,127	*19,000

Monthly Shipments of Steel Products by United States Steel Corp., Net Tons

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	*Total
1931	800,031	762,522	907,251	878,558	764,178	653,104	593,900	573,372	486,928	476,032	435,697	351,211	7,676,744
1932	426,271	413,001	388,579	395,091	338,202	324,746	272,448	291,688	316,019	310,007	275,594	227,576	3,974,062
1933	285,138	275,929	256,793	335,321	455,302	603,937	701,322	668,155	575,161	572,897	430,358	600,639	5,805,235
1934	331,777	385,500	588,209	643,009	745,063	985,337	369,938	378,023	370,306	343,962	366,119	418,630	5,925,873
1935	534,055	583,137	668,056	591,728	598,915	578,108	547,794	624,497	614,933	686,741	681,820	661,515	7,371,299
1936	721,414	676,315	783,552	979,907	984,097	886,065	950,851	923,703	961,803	1,007,417	882,643	1,067,365	10,784,273
1937	1,149,918	1,133,724	1,414,399	1,343,644	1,304,039	1,268,550	1,186,752	1,107,858	1,047,962	792,310	587,241	489,070	12,748,354
1938	518,322	474,723	572,199	501,972	465,081	478,057	441,570	558,634	577,666	663,287	679,653	.....	.....

*Less yearly adjustment.

Bookings of Fabricated Steel Plate in the United States, Net Tons

(From United States Department of Commerce)

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
1925	30,013	24,167	26,777	27,656	32,889	38,496	34,382	40,660	31,001	34,766	32,847	35,792	389,446
1926	29,965	39,889	43,089	39,662	52,890	44,938	37,300	51,342	38,860	45,139	63,271	30,034	516,378
1927	36,043	59,843	55,675	47,611	38,063	28,936	35,609	48,780	38,863	47,296	27,524	35,877	500,120
1928	51,647	64,909	55,016	55,552	49,313	40,738	41,629	51,008	43,499	59,836	62,914	52,204	628,265
1929	40,570	70,314	69,344	54,246	58,293	57,975	58,456	51,590	51,842	45,661	52,642	27,742	638,675
1930	57,083	34,662	46,137	45,454	38,328	41,774	38,283	36,513	41,066	30,197	33,151	26,787	469,435
1931	27,518	24,438	31,056	29,916	26,210	22,806	27,261	24,282	33,473	20,839	18,268	16,442	302,509
1932	17,613	17,755	12,564	14,074	17,888	18,383	12,485	11,916	11,109	16,737	7,873	9,510	167,907
1933	11,128	16,588	8,903	9,502	16,243	37,020	20,058	16,320	16,166	17,964	14,466	13,692	198,050
1934	15,897	14,641	38,924	20,085	21,891	27,395	12,523	16,293	15,108	16,581	16,629	26,025	241,992
1935	18,778	15,064	16,832	13,244	17,630	17,914	18,890	23,628	31,105	30,530	19,116	35,584	258,315
1936	38,709	27,863	30,437	30,018	51,443	52,937	60,324	31,999	35,033	33,791	40,465	51,017	484,036
1937	41,419	32,375	71,250	42,455	28,913	34,833	27,480	31,763	31,484	31,942	27,507	27,463	428,884
1938	23,422	17,827	38,052	21,958	25,141	20,044	27,773	22,069	18,551	21,793	.....	.....	.....

*Estimated.

Fabricated Structural Steel Orders in the United States, Net Tons

(From United States Department of Commerce Through 1932; 1933 on From American Institute of Steel Construction, Inc.)

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
1912	154,070	169,260	147,560	128,030	219,170	160,580	154,070	175,770	141,050	199,640	138,880	145,390	1,933,470
1913	130,500	162,000	110,250	90,030	119,250	96,750	130,500	96,750	65,250	78,750	60,750	60,750	1,201,500
1914	140,740	143,010	172,520	199,760	129,390	127,120	154,360	63,560	86,260	79,450	45,400	79,450	1,421,020
1915	57,750	69,300	147,840	143,220	140,910	184,800	198,660	196,350	154,770	180,180	242,550	279,510	1,995,840
1916	164,220	178,500	242,760	173,740	190,400	138,040	114,240	152,320	126,140	183,260	185,640	204,680	2,053,940
1917	147,620	142,780	164,560	147,620	135,520	113,740	101,640	91,960	70,180	147,620	186,340	275,880	1,725,460
1918	136,740	144,480	121,260	165,120	154,800	144,480	299,280	147,060	154,800	110,940	69,660	74,820	1,723,440
1919	31,920	34,580	47,880	66,500	130,340	172,900	196,840	207,480	207,480	207,480	183,540	226,100	1,713,040
1920	207,000	262,200	231,840	187,680	171,120	138,000	138,000	110,400	118,680	71,760	74,520	71,760	1,782,960
1921	50,940	39,620	82,070	87,730	79,240	104,710	96,220	93,390	135,840	152,820	155,650	113,200	1,191,430
1922	121,600	133,760	234,080	258,400	240,160	221,920	206,720	206,720	194,560	176,320	152,000	185,440	2,331,680
1923	227,760	243,360	290,160	243,360	177,840	165,360	162,240	184,080	165,360	159,120	171,600	249,600	2,439,840
1924	224,940	228,200	221,680	208,640	192,340	208,640	224,940	195,600	211,900	211,900	270,580	247,760	2,647,120
1925	187,380	194,320	225,550	256,780	229,020	284,540	274,130	267,190	270,660	298,420	239,430	253,310	2,980,730
1926	208,800	208,800	234,000	252,000	266,400	262,800	248,400	284,400	216,000	223,200	223,200	259,200	2,894,400
1927	195,000	240,000	232,500	262,500	232,500	225,000	341,250	270,000	262,500	288,750	236,250	262,500	3,048,750
1928	207,900	265,650	257,950	234,850	308,000	296,450	296,450	354,200	319,550	257,950	242,550	246,400	3,287,900
1929	256,025	250,635	334,565	313,775	321,475	324,170	329,175	340,725	297,990	319,550	212,135	297,605	3,597,825
1930	238,800	267,600	236,800	222,800	297,200	253,600	270,000	252,000	155,600	209,200	151,200	152,800	2,707,600
1931	158,000	158,800	178,800	284,800	152,400	172,400	159,600	124,000	194,400	109,200	90,800	97,600	1,880,800
1932	48,400	62,000	64,400	64,800	99,800	86,800	67,200	78,800	111,200	74,400	51,600	143,600	955,000
1933	93,206	63,700	87,900	56,200	52,100	101,300	67,700	95,600	72,500	63,700	65,000	103,900	922,800
1934	91,594	75,294	105,537	121,552	78,608	122,706	73,723	94,186	62,657	65,037	85,250	68,449	1,044,593
1935	64,306	75,841	102,325	95,380	60,448	120,690	65,957	102,859	90,161	102,708	91,693	96,235	1,068,603
1936	120,364	140,943	108,826	112,195	147,261	132,387	199,057	110,687	118,158	130,989	121,607	166,542	1,609,016
1937	153,806	101,710	206,321	158,471	122,939	175,552	158,341	124,897	132,432	62,267	132,835	99,070	1,628,641
1938	80,320	57,144	84,257	91,158	77,322	99,899	87,154	102,539	89,528	137,642	.....	.....	.....

Steel Castings Orders in the United States, Net Tons

(From United States Department of Commerce)

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
1922	43,230	46,520	60,080	94,920	97,350	112,120	83,010	79,560	122,840	94,980	76,400	86,420	997,430
1923	126,481	112,399	172,101	118,196	117,834	109,756	73,600	76,208	71,506	64,677	63,870	61,016	1,167,644
1924	69,872	91,502	126,986	93,518	79,988	68,019	54,538	50,321	76,005	83,221	91,388	115,605	1,000,963
1925	104,179	81,930	83,812	87,556	78,417	66,437	72,294	71,160	62,198	80,510	86,957	105,893	981,343
1926	112,322	101,495	113,770	91,540	84,451	73,785	79,798	71,325	69,740	77,836	73,477	90,143	1,039,682
1927	108,063	94,938	90,353	81,403	73,043	91,199	74,569	63,938	52,742	52,160	63,075	77,436	922,921
1928	91,448	91,076	83,755	84,086	86,796	72,107	66,992	81,286	82,762	78,860	84,742	96,318	1,000,228
1929	124,313	115,639	130,836	144,366	113,092	94,873	103,046	101,514	86,241	35,879	97,635	89,985	1,337,419
1930	101,500	114,419	122,462	92,987	91,077	61,164	57,850	50,370	49,542	45,552	48,123	49,387	884,433
1931	46,810	40,320	48,184	46,039	39,052	26,136	32,869	27,458	23,073	22,854	20,001	20,799	393,595
1932	17,214	16,759	16,323	12,459	11,111	12,488	9,301	10,147	11,882	11,896	13,235	13,022	155,837
1933	14,450	13,179	13,178	15,942	22,612	34,965	31,878	31,502	25,220	26,135	25,558	25,612	280,231
1934	26,296	35,698	60,046	63,142	46,831	41,537	41,822	25,538	20,030	24,327	21,552	27,312	434,131
1935	32,349	31,725	30,723	28,233	29,083	30,257	34,570	45,426	29,995	34,553	32,714	40,529	400,157
1936	59,019	51,701	71,341	83,188	63,950	94,345	74,011	59,393	56,877	59,431	76,394	159,430	909,080
1937	115,150	98,383	158,284	99,868	68,688	71,817	57,799	54,753	57,414	36,837	31,442	27,024	877,459
1938	29,187	30,863	28,096	21,869	20,636	21,074	36,641	24,814	25,565	25,418	.....	.....	.....

Malleable Castings Orders in the United States, Net Tons

(From United States Department of Commerce)

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1925	67,312	55,638	64,619	66,360	59,232	55,693	65,220	56,511	58,098	75,039	63,895	63,144	750,761
1926	74,545	67,188	69,174	63,096	59,109	55,796	52,455	62,264	57,155	55,085	47,345	49,558	712,770
1927	61,597	68,767	66,376	64,427	57,311	54,456	53,484	51,368	46,161	48,062	43,202	57,579	672,790
1928	62,328	64,419	70,288	62,056	63,847	61,071	60,964	66,128	61,163	65,780	59,664	61,182	758,890
1929	76,787	77,976	86,744	80,777	76,949	65,315	61,358	62,541	52,647	61,164	40,145	43,475	785,878
1930	53,558	56,268	54,209	48,884	42,173	30,489	27,271	23,148	24,429	23,027	25,413	23,853	432,722
1931	29,688	30,003	32,424	33,926	26,111	21,110	18,160	17,754	16,907	17,524	17,413	18,125	279,145
1932	20,332	17,808	16,235	16,185	16,463	13,330	8,658	7,776	10,582	12,850	14,304	14,504	169,027
1933	12,645	11,273	12,508	18,449	24,671	31,997	28,458	28,323	22,744	19,933	20,830	26,166	257,997
1934	32,501	36,594	42,961	38,453	32,639	24,499	21,862	21,306	19,511	18,785	28,530	36,505	354,146
1935	44,568	41,225	40,237	37,394	31,136	25,668	25,526	35,602	35,658	45,246	47,778	42,573	452,611
1936	43,852	38,278	48,008	47,933	44,136	42,848	41,031	45,179	44,361	55,521	58,152	67,035	576,334
1937	54,070	60,187	68,502	62,940	46,018	43,141	41,353	49,376	41,652	34,810	28,170	19,753	549,972
1938	17,076	19,557	20,556	19,724	17,564	18,143	16,905	25,752	29,061	32,989	.....	.....	.....

Annual Shipments of Lake Superior Iron Ore by Water, Gross Tons

(Reported by Lake Superior Iron Ore Association)

	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938
Shipments	51,107,136	53,980,874	65,204,600	46,582,982	23,467,786	3,567,985	21,623,898	22,249,600	28,362,368	44,822,023	62,598,836	19,263,011

Monthly Average Pig Iron Prices Computed From

Composite Pig

Average of THE IRON AGE *quotations on basic pig iron at Buffalo, Valley and Philadel*

	1903	1904	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920
Jan.	$22.06	$13.47	$15.95	$17.30	$23.24	$16.84	$15.68	$17.12	$13.63	$12.65	$16.49	$12.76	$12.38	$17.81	$28.88	$33.21	$31.36	$39.39
Feb.	21.47	13.17	15.84	17.10	23.33	16.30	15.35	16.77	13.83	12.61	16.31	13.18	12.38	17.76	29.75	33.21	31.36	42.35
March	21.54	13.43	15.98	17.10	23.02	15.97	15.03	16.29	13.88	12.93	16.07	13.16	12.34	18.06	32.18	33.21	30.10	42.24
April	20.93	13.65	15.68	17.03	23.03	15.55	14.38	15.97	13.79	13.09	15.74	13.13	12.37	18.15	38.56	32.71	27.11	43.01
May	19.54	13.19	15.63	17.07	23.97	15.16	14.38	15.27	13.53	13.27	14.98	13.06	12.37	18.08	41.87	32.71	26.91	43.64
June	18.83	12.66	15.04	16.94	23.47	15.35	14.71	14.90	13.27	13.36	14.35	12.97	12.45	17.91	47.95	32.71	26.46	44.09
July	17.79	11.84	14.37	16.96	22.51	14.91	15.18	14.72	13.21	13.68	13.99	12.92	12.55	17.79	52.11	32.73	26.37	45.44
Aug.	16.98	12.07	14.64	17.68	21.82	15.05	15.52	14.39	13.12	14.15	13.93	12.91	13.55	17.63	51.43	32.73	26.83	47.38
Sept.	16.03	12.07	14.94	18.59	20.55	15.03	16.41	14.17	12.99	14.74	13.97	12.83	14.28	17.82	46.93	32.73	27.11	47.83
Oct.	15.02	12.67	15.61	19.52	19.88	14.79	17.25	13.79	12.84	16.01	13.93	12.67	14.67	19.18	33.21	34.31	27.52	45.05
Nov.	14.23	14.37	17.01	22.17	18.66	15.21	17.46	13.74	12.71	16.52	13.39	12.42	15.82	24.36	33.21	34.36	30.34	38.65
Dec.	13.75	15.77	17.10	22.82	17.52	15.73	17.26	13.78	12.59	16.63	13.06	12.39	17.34	28.63	33.21	34.26	36.13	34.51
Aver.	*18.18*	*13.20*	*15.65*	*18.36*	*21.75*	*15.49*	*15.72*	*15.08*	*13.28*	*14.14*	*14.68*	*12.87*	*13.54*	*19.45*	*39.11*	*33.24*	*28.96*	*42.76*

Basic Pig Iron at Mahoning or Shenango Valley Furnace, Gross Ton

	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938
Jan.	$18.15	$25.80	$21.25	$22.00	$20.00	$18.00	$17.00	$17.50	$18.50	$17.00	$15.00	$13.50	$17.00	$18.00	$19.00	$20.50	$23.50
Feb.	17.75	26.25	22.00	22.00	20.00	18.00	17.00	17.50	18.50	16.75	14.62	13.50	17.00	18.00	19.00	20.75	23.50
March	17.94	30.13	21.94	21.30	20.00	18.40	17.00	17.50	18.50	16.50	14.50	13.50	17.00	18.00	19.00	23.10	23.50
April	20.00	31.05	21.55	20.13	18.63	19.00	16.88	17.90	18.50	16.50	14.50	13.50	17.25	18.00	19.00	23.50	23.50
May	24.60	29.00	20.50	18.81	18.38	18.20	16.30	18.38	18.50	16.25	14.20	14.20	18.00	18.00	19.00	23.50	23.50
June	25.00	27.38	19.63	18.05	18.00	17.88	15.45	18.50	18.50	15.50	14.00	15.00	18.00	18.00	19.00	23.50	22.70
July	24.25	25.10	19.00	18.00	17.63	17.50	16.00	18.50	18.10	15.50	13.50	15.50	18.00	18.00	19.00	23.50	19.50
Aug.	26.60	24.75	19.00	18.00	17.50	17.30	16.00	18.50	18.00	15.50	13.50	16.20	18.00	18.00	19.00	23.50	19.50
Sept.	32.63	24.88	19.00	18.30	17.50	17.06	16.19	18.50	17.60	15.50	13.50	17.00	18.00	18.00	19.00	23.50	19.75
Oct.	30.90	23.50	19.00	18.63	18.00	17.00	17.10	18.50	17.00	15.25	13.50	17.00	18.00	18.00	19.00	23.50	20.50
Nov.	27.75	20.88	19.13	19.88	18.50	17.00	17.50	18.50	17.00	15.00	13.50	17.00	18.00	19.00	19.25	23.50	20.50
Dec.	24.81	21.00	20.90	20.00	18.50	17.00	17.50	18.50	17.00	15.00	13.50	17.00	18.00	19.00	20.00	23.50	20.50
Aver.	*24.20*	*25.81*	*20.24*	*19.59*	*18.85*	*17.70*	*16.66*	*18.19*	*17.98*	*15.85*	*13.98*	*15.24*	*17.69*	*18.17*	*19.10*	*22.99*	*21.70*

No. 2 Foundry Pig Iron at Mahoning or Shenango Valley Furnace, Gross Ton

	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938
Jan.	$19.30	$27.00	$22.50	$22.38	$20.50	$18.50	$17.25	$17.50	$18.50	$17.00	$15.50	$14.50	$17.50	$18.50	$19.50	$21.00	$24.00
Feb.	18.88	27.50	23.00	22.00	20.50	18.50	17.25	17.50	18.50	16.75	15.12	14.50	17.50	18.50	19.50	21.25	24.00
March	19.00	30.50	23.00	21.10	20.50	18.50	17.25	17.75	18.50	16.50	15.00	14.50	17.50	18.50	19.50	23.60	24.00
April	20.75	31.00	21.80	20.13	19.00	18.50	17.25	18.00	18.50	17.00	15.00	14.50	17.75	18.50	19.50	24.00	24.00
May	23.80	30.20	20.75	19.13	18.88	18.50	17.20	18.50	18.50	17.00	14.70	14.70	18.50	18.50	19.50	24.00	24.00
June	24.00	27.63	19.63	18.30	17.96	18.13	16.75	18.50	18.50	17.00	14.50	15.50	18.50	18.50	19.50	24.00	23.20
July	24.25	25.50	19.00	18.50	17.69	18.00	16.65	18.50	18.10	17.00	14.50	16.00	18.50	18.50	19.50	24.00	20.00
Aug.	32.60	24.88	19.13	18.50	17.50	17.60	16.50	18.50	18.00	17.00	14.50	16.70	18.50	18.50	19.50	24.00	20.00
Sept.	34.88	24.75	19.80	18.80	17.63	17.50	16.88	18.50	17.80	17.00	14.50	17.50	18.50	18.50	19.50	24.00	20.25
Oct.	31.80	23.60	19.50	19.13	18.50	17.50	17.10	18.50	17.13	16.63	14.50	17.50	18.50	18.50	19.50	24.00	21.00
Nov.	27.88	21.88	9.50	20.39	19.00	17.45	17.63	18.50	17.00	16.00	14.50	17.50	18.50	19.50	19.75	24.00	21.00
Dec.	25.63	22.00	21.20	20.50	18.80	17.25	17.70	18.50	17.00	15.70	14.50	17.50	18.50	19.50	20.50	24.00	21.00
Aver.	*25.25*	*26.37*	*20.73*	*19.90*	*18.87*	*18.00*	*17.12*	*18.23*	*18.00*	*16.72*	*14.73*	*15.91*	*18.19*	*18.67*	*19.60*	*23.49*	*22.20*

Malleable Pig Iron at Mahoning or Shenango Valley Furnace, Gross Ton

	1924	1925	1926	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938
Jan.	$22.39	$22.39	$20.50	$18.50	$17.30	$18.00	$19.00	$17.50	$16.00	$14.50	$17.50	$18.50	$19.50	$21.00	$24.00
Feb.	23.00	22.00	20.50	18.50	17.25	18.00	19.00	17.25	15.62	14.50	17.50	18.50	19.50	21.25	24.00
March	22.50	21.50	20.50	18.50	17.25	18.25	19.00	17.00	15.50	14.50	17.50	18.50	19.50	23.60	24.00
April	22.10	20.63	19.00	18.50	17.25	18.50	19.00	17.00	15.50	14.50	17.75	18.50	19.50	24.00	24.00
May	21.00	19.25	18.88	18.50	17.25	19.00	19.00	17.00	15.20	14.70	18.50	18.50	19.50	24.00	24.00
June	19.88	18.50	18.05	18.13	17.00	19.00	19.00	17.00	15.00	15.50	18.50	18.50	19.50	24.00	23.20
July	19.00	18.50	17.75	18.00	17.00	19.00	18.60	17.00	14.50	16.00	18.50	18.50	19.50	24.00	20.00
Aug.	19.13	18.50	17.50	17.60	17.00	19.00	18.50	17.00	14.50	16.70	18.50	18.50	19.50	24.00	20.00
Sept.	19.80	18.80	17.63	17.50	17.19	19.00	18.30	17.00	14.50	17.50	18.50	18.50	19.50	24.00	20.25
Oct.	19.50	19.13	18.50	17.50	17.55	19.00	17.75	16.88	14.50	17.50	18.50	18.50	19.50	24.00	21.00
Nov.	19.75	20.38	19.00	17.50	18.19	19.00	17.50	16.50	14.50	17.50	18.50	19.50	19.75	24.00	21.00
Dec.	21.20	20.50	18.75	17.50	18.15	19.00	17.50	16.20	14.50	17.50	18.50	19.50	20.50	24.00	21.00
Aver.	*20.77*	*20.01*	*18.88*	*18.02*	*17.37*	*18.73*	*18.51*	*16.94*	*14.98*	*15.91*	*18.19*	*18.67*	*19.60*	*23.49*	*22.20*

No. 2 Foundry Pig Iron at St. Louis and at Granite City,* Ill., Furnace, Gross Ton

	1926	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938
Jan.	$24.56	$22.31	$20.56	$20.75	$20.50	$18.25	$18.33	$18.33	$17.50	$18.50	$19.50	$21.00	$24.00
Feb.	24.56	22.06	20.56	20.75	20.50	18.25	18.33	18.33	17.50	18.50	19.50	21.25	24.00
March	24.56	21.86	20.56	20.75	20.44	18.25	18.33	18.33	17.50	18.50	19.50	23.60	24.00
April	24.00	21.56	20.56	20.75	20.25	18.25	18.33	17.34	17.75	18.50	19.50	24.00	24.00
May	23.56	21.56	19.81	20.75	19.75	18.25	18.33	16.55	18.50	18.50	19.50	24.00	24.00
June	23.16	21.31	19.81	20.75	19.75	18.25	18.33	16.85	18.50	18.50	19.50	24.00	23.20
July	23.06	21.06	19.76	20.75	19.10	18.25	18.33	17.35	18.50	18.50	19.50	24.00	20.00
Aug.	23.06	20.56	19.68	20.69	19.00	18.25	18.33	17.85	18.50	18.50	19.50	24.00	20.00
Sept.	23.06	20.56	20.31	20.50	18.70	18.25	18.33	*17.50	18.50	18.50	19.50	24.00	20.25
Oct.	22.56	20.56	20.56	20.50	18.25	18.25	18.33	17.50	18.50	18.70	19.50	24.00	21.00
Nov.	22.36	20.56	20.87	20.50	18.25	18.25	18.33	17.50	18.50	19.50	19.75	24.00	21.00
Dec.	22.56	20.56	20.81	20.50	18.25	18.25	18.33	17.50	18.50	19.50	20.50	24.00	21.00
Aver.	*23.42*	*21.21*	*20.33*	*20.66*	*19.39*	*18.25*	*18.33*	*17.58*	*18.19*	*18.68*	*19.60*	*23.49*	*22.20*

*Since Sept. 1, 1933, Granite City furnace prices are quoted.

Weekly Market Quotations In THE IRON AGE

Iron Price

Valley furnace and foundry iron at Chicago, Birmingham, phia. Quoted in gross tons

	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938
Jan.	$31.18	$18.48	$26.78	$22.15	$22.44	$21.79	$19.44	$17.63	$18.43	$18.19	$15.90	$14.68	$13.56	$16.90	$17.90	$18 84	$20.25	$23.25
Feb.	28.45	18.14	27.20	22.84	22.50	21.77	19.07	17.73	18.38	18.02	15.80	14.51	13.56	16.90	17.90	18 84	20.50	23.25
March	25.18	18.35	30.11	22.81	21.99	21.65	19.03	17.73	18.36	17.75	15.71	14.45	13.56	16.90	17.90	18 84	22.85	23.25
April	23.73	20.00	30.83	22.31	20.95	20.96	19.21	17.67	18.52	17.73	15.79	14.35	13.76	17.07	17.90	18 84	23.25	23.25
May	22.78	23.35	29.74	21.40	19.85	20.69	19.09	17.45	18.70	17.60	15.76	14.12	14.48	17.90	17.85	18.84	23.25	23.25
June	21.73	23.95	28.23	20.27	19.22	20.00	18.92	17.23	18.65	17.48	15.62	14.01	15.01	17.90	17.84	18.84	23.25	22.98
July	20.22	23.86	25.96	19.31	18.96	19.51	18.56	17.10	18.48	17.16	15.56	13.76	15.50	17.90	17.84	18.84	23.25	19.61
Aug.	18.97	26.69	25.19	19.40	19.01	19.46	18.17	17.11	18.39	16.90	15.51	13.69	16.09	17.90	17.84	18.73	23.25	19.61
Sept.	19.89	31.78	25.02	19.46	19.39	19.46	18.03	17.54	18.27	16.70	15.44	13.64	16.71	17.90	17.84	18.73	23.25	19.82
Oct.	19.97	30.57	23.30	19.46	19.92	19.69	17.96	17.94	18.33	16.31	15.21	13.63	16.61	17.90	17.87	18.73	23.25	20.57
Nov.	19.79	27.82	21.40	19.79	21.16	20.13	17.59	18.46	18.36	16.21	14.97	13.59	16.61	17.90	18.84	18.98	23.25	20.61
Dec.	19.11	25.70	21.88	21.60	21.54	19.94	17.55	18.51	18.24	15.95	14.86	13.56	16.90	17.90	18.84	19.73	23.25	20.61
Aver.	*22.58*	*24.06*	*26.30*	*20.90*	*20.58*	*20.42*	*18.55*	*17.68*	*18.43*	*17.17*	*15.51*	*14.00*	*15.20*	*17.58*	*18.03*	*18.90*	*23.74*	*21.67*

Eastern Pennsylvania No. 2X Foundry Pig Iron at Philadelphia, Gross Ton

	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938
Jan.	$21.34	$29.76	$24.11	$25.01	$24.26	$22.76	$20.56	$21.76	$21.26	$18.26	$16.14	$13.84	$19.51	$20.51	$21.56	$23.01	$25.84
Feb.	21.09	30 01	24.04	25.01	24.14	22.26	21.14	21.76	21.26	18.26	16.14	13.34	19.51	20.51	21.56	23.26	25.84
March	21 96	32.30	24.16	24.21	23.36	22.26	21.26	21.89	20.76	18.26	16.12	13.84	19.51	20.51	21.56	25 61	25.84
April	23 32	32.95	23.06	22.82	23.26	22.26	21.26	22.26	20.76	18.26	16.09	14.59	19.76	20.51	21.56	26.01	25.84
May	26.09	32.76	22.67	21.51	22.89	22.26	21.26	22.26	20.39	17.76	15.34	15.99	20.51	20.55	21.56	26.01	25.84
June	27.06	30.76	21.85	21.26	22.66	22.14	21.26	22.26	20.26	17.71	15.34	16.84	20.51	20.56	21.56	26.01	25.04
July	27.92	27.68	21.26	21.26	22.26	21.51	20.86	22.16	19.96	17.51	14.84	17.22	20.51	20.56	21.56	26.01	21.84
Aug.	32.26	25.89	21.51	21.57	22.26	21.26	20.76	21.76	19.76	17.32	14.54	17.79	20.51	20.56	21.56	26.01	21.84
Sept.	34.83	26.26	21.76	21.96	22.26	20.76	21.01	21.76	19.56	16.86	14.34	18.59	20.51	20.56	21.56	26.01	21.84
Oct.	32.54	24.04	21.76	22.64	22.26	20.51	21.26	21.76	19.26	16.64	14.28	18.51	20.51	20.56	21.56	26.01	22.59
Nov.	30.39	23.01	22.64	23.64	23.56	20.26	21.64	21.76	19.01	16.07	14.09	18.51	20.51	21.56	21.81	26.01	22.84
Dec.	28.86	24.26	24.56	24.26	23.39	20.26	21.76	21.46	18.26	16.01	13.84	19.51	20.51	21.56	22.56	26.06	22.84
Aver.	*27.27*	*28.31*	*22.78*	*22.93*	*23.05*	*21.55*	*21.17*	*21.90*	*20.04*	*17.41*	*15.09*	*16.55*	*20.20*	*20.71*	*21.66*	*25.50*	*24.00*

Basic Pig Iron at Philadelphia, Gross Ton

	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938
Jan.	$20.18	$27.80	$23.00	$24.25	$23.00	$21.50	$19 50	$19.75	$19.50	$17.25	$16.25	$13.50	$18.76	$19.76	$20 81	$22.26	$25.34
Feb.	19 84	28.19	22 69	23.88	23.00	21.19	19.50	19.88	19.44	17.25	16.25	13.50	18.76	19.76	20.81	22 51	25.34
March	22.61	29.56	21.81	23.55	22.10	20.85	19.50	20.25	19.06	17.25	16.00	13.50	18.76	19.76	20.81	24.86	25.34
April	21.00	30.81	21.50	22.31	21.75	20.75	19.50	20.25	18.90	17.13	16.00	14.09	18.91	19.76	20.81	25.26	25.34
May	24.00	30.60	21.00	21.13	21.75	20.75	19.10	20.25	18.75	17.00	16.00	15.29	19.76	19.79	20.81	25.26	25.34
June	25.00	28.14	21.00	21.50	21.45	20.75	19.00	20.25	18.75	17.00	16.00	16.09	19.76	19 81	20 81	25.26	24.54
July	25.75	26.60	20.20	21.50	21.00	20.75	18.95	20.20	18.45	16.75	15.50	16.59	19.76	19 81	20.81	25.26	21.34
Aug.	27.23	25.00	20.00	20.50	20.95	20.15	18.75	19.75	18.25	16.75	14.20	17.24	19.76	19 81	20.81	25.26	21.34
Sept.	30.83	25.00	20.00	20.70	20.75	20.00	18.88	19.75	18.15	16.75	13.50	17.84	19.76	19 81	20 81	25.26	21.34
Oct.	29.30	24.20	20.00	21.25	20.69	20.00	19.45	19.75	17.75	16.75	13.50	17.76	19.76	19 81	20 81	25.26	22.09
Nov.	27.83	22.88	21.13	22.39	22.60	19.60	19.75	19.75	17.75	16.39	13.50	17.76	19.76	20.81	21.06	25.26	22.34
Dec.	27.31	23.13	23.41	23.00	22.00	19.25	20.05	19.55	17.75	16.25	13.50	18.76	19.76	20.81	21.81	25.31	22.34
Aver.	*25.08*	*26.83*	*21.31*	*22.16*	*21.75*	*20.46*	*19.33*	*19.95*	*18.54*	*16.87*	*15.02*	*15.99*	*19.45*	*19.96*	*20.91*	*24.75*	*23.50*

No. 2 Foundry Pig Iron at Cleveland Furnace, Gross Ton

	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938
Jan.	$20.06	$27.37	$23.20	$23.37	$21.82	$19.00	$18.00	$19.00	$19.00	$17.50	$16.00	$15.00	$17.50	$18.50	$19.50	$21.00	$24.00
Feb.	20.06	28.50	24.00	23.49	21.88	18.63	18.00	19.00	19.00	17.50	16.00	15.00	17.50	18.50	19.50	21.25	24.00
March	21.55	31.65	24.00	23.97	21.31	19.40	18.00	19.00	19.00	17.20	15.70	15.00	17.50	18.50	19.50	23.60	24.00
April	20.81	32.02	23.75	22.32	20.35	19.37	18.00	19.00	18.88	17.00	15.50	15.00	18.00	18.50	19.50	24.00	24.00
May	23.75	31.71	22.75	20.37	19.50	19.00	18.00	19.00	18.50	17.00	15.50	15.30	18.50	18.50	19.50	24.00	24.00
June	24.06	29.96	21.00	19.62	19.19	18.70	17.88	19.00	18.50	17.00	15.50	15.50	18.50	18.50	19.50	24.00	23.20
July	24.75	26.94	19.75	19.50	19.00	18.50	17.50	19.00	18.00	17.00	15.50	16.00	18.50	18.50	19.50	24.00	20.00
Aug.	31.31	25.90	20.06	19.50	19.00	18.50	17.50	19.00	18.00	17.00	15.50	16.70	18.50	18.50	19.50	24.00	20.00
Sept.	35.94	25.37	20.31	19.50	19.00	18.50	17.88	19.00	17.60	17.00	15.00	17.50	18.50	18.50	19.50	24.00	20.25
Oct.	33.59	24.75	20.50	20.05	19.37	18.38	18.13	19.00	17.50	17.00	15.00	17.50	18.50	18.50	19.50	24.00	21.00
Nov.	29.97	22.85	20.81	21.82	20.10	18.00	19.00	19.00	17.50	17.00	15.00	17.50	18.50	19.50	19.75	24.00	21.00
Dec.	26.85	22.56	21.88	21.76	19.88	18.00	19.00	19.00	17.50	16.60	15.00	17.50	18.50	19.50	20.50	24.00	21.00
Aver.	*26.05*	*27.47*	*21.84*	*21.19*	*20.03*	*18.67*	*18.16*	*19.00*	*18.25*	*17.07*	*15.43*	*16.13*	*18.21*	*18.67*	*19.60*	*23.49*	*22.20*

No. 2 Foundry Pig Iron at Buffalo Furnace, Gross Ton

	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938
Jan.	$19 44	$26.94	$22.25	$23.00	$21.00	$18 50	$17.00	$18.00	$18.75	$17.50	$16.00	$16.00	$17.50	$18.50	$19.50	$21.00	$24.00
Feb.	18 87	27.56	22.25	22.75	21.00	17.39	17.00	18.39	18.50	17.50	16.00	16.00	17.50	18.50	19.50	21.25	24.00
March	18.30	29.05	21.81	22.12	21.00	17.05	17.00	18.50	18.50	17.50	16.00	16.00	17.50	18.50	19.50	23.60	24.00
April	20.81	29.56	21.37	20.65	21.00	17.50	17.00	18.50	18.50	17.50	16.00	16.00	17.50	18.50	19.50	24.00	24.00
May	22.62	29.40	20.25	19.00	20.75	17.50	17.00	18.50	18.50	17.13	16.00	16.00	18.50	18.50	19.50	24.00	24.00
June	23.05	29.06	19.37	19.00	19.60	17.39	17.00	18.75	18.50	17.00	16.00	16.00	18.50	18.50	19.50	24.00	23.20
July	24.50	26.00	19.00	18.85	19.00	16.94	17.00	19.50	18.50	17.00	16.00	16.50	18.50	18.50	19.50	24.00	20.00
Aug.	30.70	24.95	19.19	18.72	19.00	16.20	17.00	19.50	18.50	17.00	16.00	17.10	18.50	18.50	19.50	24.00	20.00
Sept.	33.94	24.87	19.37	18.75	19.00	16.25	17.00	19.50	18.50	17.00	16.00	17.50	18.50	18.50	19.50	24.00	20.13
Oct.	31.12	23.06	19.05	19.40	19.00	16.88	17.10	19.50	17.75	17.00	16.00	17.50	18.50	18.50	19.50	24.00	20.88
Nov.	27.80	20.87	20.50	21.19	19.00	17.00	17.88	19.50	17.50	17.00	16.00	17.50	18.50	19.50	19.75	24.00	21.00
Dec.	25.50	21.56	22.62	21.50	19.00	17.00	18.00	19.50	17.50	16.80	16.00	17.50	18.50	19.50	20.50	24.00	21.00
Aver.	*24.72*	*26.07*	*20.59*	*20.41*	*19.86*	*17.13*	*17.17*	*18.97*	*18.29*	*17.16*	*16.00*	*16.63*	*18.17*	*18.67*	*19.60*	*23.49*	*22.18*

No. 2 Foundry Pig Iron at Chicago Furnace, Gross Ton

	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938
Jan.	$18.90	$28.90	$23.70	$24.00	$23.00	$20.88	$18.50	$20.00	$20.00	$17.50	$16.50	$15.50	$17.50	$18.50	$19.50	$21.00	$24.00
Feb.	19.00	29.75	24.50	24.00	23.00	20.25	18.50	20.00	20.00	17.50	16.50	15.50	17.50	18.50	19.50	21.25	24.00
March	20.00	31.25	24.38	23.80	23.00	20.00	18.50	20.00	19.50	17.50	16.50	15.50	17.50	18.50	19.50	23.60	24.00
April	20.50	32.00	24.10	22.50	22.00	20.00	18.50	20.00	19.40	17.50	16.00	15.50	17.75	18.50	19.50	24.00	24.00
May	22.60	32.00	22.75	21.13	21.63	20.00	18.20	20.00	19.00	17.50	16.00	15.80	18.50	18.50	19.50	24.00	24.00
June	23.25	31.25	21.25	20.30	21.10	20.00	18.00	20.00	18.39	17.50	16.00	16.00	18.50	18.50	19.50	24.00	23.20
July	24.25	27.90	19.60	20.50	21.00	20.00	17.60	20.00	17.90	17.50	15.50	16.78	18.50	18.50	19.50	24.00	20.00
Aug.	28.60	27.00	20.38	20.50	21.00	19.50	17.63	20.00	17.50	17.50	15.50	17.10	18.50	18.50	19.50	24.00	20.00
Sept.	32.00	26.75	20.50	21.00	21.00	19.50	18.25	20.00	17.50	17.50	15.50	17.50	18.50	18.50	19.50	24.00	20.25
Oct.	31.40	25.00	20.50	21.63	21.00	19.00	18.80	20.00	17.50	17.00	15.50	17.50	18.50	18.70	19.50	24.00	21.00
Nov.	29.75	23.13	21.00	22.75	21.00	18.50	20.00	20.00	17.50	17.00	15.50	17.50	18.50	19.50	19.75	24.00	21.00
Dec.	28.00	23.00	22.50	23.00	21.00	18.50	20.00	20.00	17.50	16.70	15.50	17.50	18.50	19.50	20.50	24.00	21.00
Aver.	*24.85*	*28.16*	*22.10*	*22.09*	*21.64*	*19.68*	*18.54*	*20.00*	*18.47*	*17.35*	*15.87*	*16.47*	*18.19*	*18.68*	*19.60*	*23.49*	*22.20*

Malleable Pig Iron at Chicago Furnace, Gross Ton

	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938
Jan.	$18.90	$28.90	$23.88	$24.00	$23.00	$20.88	$18.50	$20.00	$20.00	$17.50	$16.50	$15.50	$17.50	$18.50	$19.50	$21.00	$24.00
Feb.	19.13	29.75	24.50	24.00	23.00	20.25	18.50	20.00	20.00	17.50	16.50	15.50	17.50	18.50	19.50	21.25	24.00
March	20.00	31.25	24.38	24.00	23.00	20.00	18.50	20.00	19.50	17.50	16.50	15.50	17.50	18.50	19.50	23.60	24.00
April	20.50	32.00	24.10	22.63	22.00	20.00	18.50	20.00	19.40	17.50	16.00	15.50	17.75	18.50	19.50	24.00	24.00
May	22.60	32.00	22.75	21.25	21.42	20.00	18.22	20.00	19.00	17.50	16.00	15.80	18.50	18.50	19.50	24.00	24.00
June	23.25	31.25	21.25	20.60	21.10	20.00	18.00	20.00	18.50	17.50	16.00	16.00	18.50	18.50	19.50	24.00	23.20
July	24.25	27.90	19.60	20.50	21.00	20.00	17.60	20.00	17.90	17.50	15.50	16.78	18.50	18.50	19.50	24.00	20.00
Aug.	28.60	27.00	20.38	20.50	21.00	19.50	17.63	20.00	17.50	17.50	15.50	17.10	18.50	18.50	19.50	24.00	20.00
Sept.	32.00	26.75	20.50	21.00	21.00	19.50	18.25	20.00	17.50	17.50	15.50	17.50	18.50	18.50	19.50	24.00	20.25
Oct.	31.40	25.00	20.50	21.63	21.00	19.00	18.80	20.00	17.50	17.10	15.50	17.50	18.50	18.70	19.50	24.00	21.00
Nov.	29.75	23.13	20.88	22.75	21.00	18.50	20.00	20.00	17.50	17.00	15.50	17.50	18.50	19.50	19.75	24.00	21.00
Dec.	28.00	23.00	22.62	23.00	21.00	18.50	20.00	20.00	17.50	16.70	15.50	17.50	18.50	19.50	20.50	24.00	21.00
Aver.	*24.87*	*28.16*	*22.11*	*22.15*	*21.63*	*19.68*	*18.54*	*20.00*	*18.48*	*17.36*	*15.87*	*16.47*	*18.19*	*18.68*	*19.60*	*23.49*	*22.20*

Lake Superior Charcoal Pig Iron at Chicago, Gross Ton

	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938
Jan.	$31.10	$33.15	$29.15	$29.04	$29.04	$27.04	$27.04	$27.04	$27.04	$27.04	$23.17	$23.17	$23.54	$24.04	$25.25	$26.54	$30.24
Feb.	29.38	33.90	29.15	29.04	29.04	27.04	27.04	27.04	27.04	27.04	23.17	23.17	23.54	24.04	25.25	26.79	30.24
March	26.00	35.40	29.15	29.04	29.04	27.04	27.04	27.04	27.04	26.24	23.17	23.17	23.54	24.04	25.25	29.44	30.24
April	26.50	36.53	29.15	29.04	29.04	27.04	27.04	27.04	27.04	25.04	23.17	23.17	24.79	24.13	25.25	30.04	30.32
May	28.40	36.65	29.15	29.04	29.04	27.04	27.04	27.04	27.04	25.04	23.17	23.17	24.04	24.25	25.25	30.04	30.34
June	29.75	36.65	29.12	29.04	29.04	27.04	27.04	27.04	27.04	25.04	23.17	23.17	24.04	24.25	25.25	30.04	30.34
July	31.65	34.81	29.04	29.04	29.04	27.04	27.04	27.04	27.04	25.04	23.17	23.17	24.04	24.25	25.25	30.04	28.34
Aug.	34.05	32.04	29.04	29.04	29.04	27.04	27.04	27.04	27.04	25.04	23.17	23.17	24.04	24.25	25.25	30.04	28.34
Sept.	36.15	32.04	29.04	29.04	29.04	27.04	27.04	27.04	27.04	25.04	23.17	23.67	24.04	24.25	25.25	30.04	28.34
Oct.	36.15	29.86	29.04	29.04	27.54	27.04	27.04	27.04	27.04	25.04	23.17	23.54	24.04	24.85	25.25	30.04	28.34
Nov.	36.15	28.40	29.04	29.04	27.54	27.04	27.04	27.04	27.04	25.04	23.17	23.54	24.04	25.25	25.50	30.16	28.34
Dec.	34.65	29.15	29.04	29.04	27.04	27.04	27.04	27.04	27.04	23.04	23.17	23.54	24.04	25.25	26.25	30.24	28.34
Aver.	*31.66*	*33.22*	*29.09*	*29.04*	*28.58*	*27.04*	*27.04*	*27.04*	*26.87*	*25.31*	*23.17*	*23.30*	*23.98*	*24.35*	*25.35*	*29.45*	*29.31*

Southern No. 2 Foundry Pig Iron at Birmingham, Gross Ton

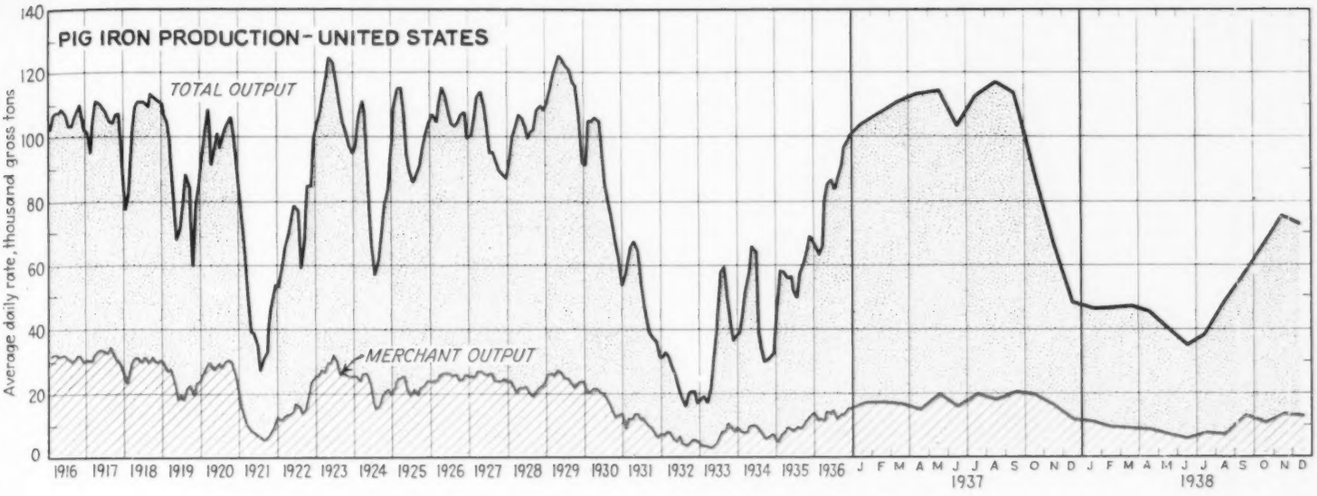
	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938
Jan.	$16.20	$23.25	$21.50	$20.00	$22.00	$18.50	$16.00	$16.50	$14.50	$13.80	$11.50	$11.00	$13.50	$14.50	$15.50	$17.38	$20.38
Feb.	15.00	24.38	22.50	20.00	22.00	18.00	16.00	16.50	14.63	12.88	11.00	11.00	13.50	14.50	15.50	17.63	20.38
March	15.00	26.40	22.50	20.00	22.00	18.00	16.00	16.00	14.50	12.38	11.00	11.00	13.50	14.50	15.50	19.98	20.38
April	15.88	27.00	22.30	20.00	22.00	18.00	16.00	15.40	14.00	12.00	11.00	11.25	13.50	14.50	15.50	20.38	20.38
May	17.60	26.85	21.50	20.00	22.00	18.00	15.70	15.00	14.00	12.00	11.00	12.00	14.30	14.50	15.50	20.38	20.38
June	18.38	25.75	20.00	19.60	21.20	18.00	15.88	15.00	14.00	12.00	11.00	12.00	14.50	14.50	15.50	20.38	19.58
July	18.25	25.00	18.00	18.00	21.00	17.44	15.50	14.63	14.00	12.00	11.00	12.50	14.50	14.50	15.50	20.38	16.38
Aug.	20.10	23.70	17.50	18.00	21.00	17.25	15.69	14.50	14.00	12.00	11.00	13.10	14.50	14.50	*15.88	20.38	16.38
Sept.	26.00	22.75	17.50	18.50	20.75	17.25	16.25	14.50	14.00	12.00	11.00	13.50	14.50	14.50	15.88	20.38	16.63
Oct.	26.80	20.63	17.50	19.38	20.00	17.25	16.25	14.50	14.00	12.00	11.00	13.50	14.50	14.50	15.88	20.28	17.38
Nov.	23.50	19.60	17.75	21.00	20.00	16.00	16.39	14.50	14.00	12.00	11.00	13.50	14.50	14.75	16.13	20.38	17.38
Dec.	22.88	21.00	19.80	22.00	20.00	16.00	16.50	14.50	14.00	12.00	11.00	13.50	14.50	15.50	16.88	20.38	17.38
Aver.	*19.63*	*23.86*	*19.86*	*19.71*	*21.16*	*17.47*	*16.01*	*15.13*	*14.14*	*12.27*	*11.04*	*12.32*	*14.15*	*14.60*	*15.76*	*19.87*	*18.58*

*Commencing August, 1936, 38c. a ton deducted for 0.70 phosphorus and over.

Southern No. 2 Foundry Pig Iron at Cincinnati, Gross Ton

	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938
Jan.	$20.70	$27.45	$25.55	$24.05	$25.69	$22.19	$19.69	$20.19	$17.69	$14.19	$14.07	$13.82	$18.13	$19.13	$20.20	$20.69	$23.89
Feb.	20.00	28.68	26.55	24.05	25.69	21.69	19.69	20.19	17.19	14.19	13.82	13.82	18.13	19.13	20.20	20.94	23.89
March	19.50	30.80	26.55	24.05	25.69	21.69	19.69	19.69	16.69	14.19	13.82	13.82	18.13	19.13	20.20	23.29	23.89
April	20.38	31.05	26.35	24.05	25.69	21.69	19.69	19.09	16.69	14.19	13.82	14.32	18.13	19.13	20.20	23.69	23.89
May	22.10	30.75	25.55	24.05	25.69	21.69	19.39	18.69	16.69	14.69	13.82	15.96	19.13	19.13	20.20	23.69	23.89
June	23.00	29.30	24.05	23.25	24.59	21.69	19.56	18.69	16.69	14.69	13.82	16.51	19.13	19.20	20.20	23.69	23.12
July	22.30	28.85	22.05	22.18	24.19	21.13	19.19	17.99	16.39	14.69	13.82	17.01	19.13	19.20	20.20	23.69	20.06
Aug.	24.35	27.68	21.55	22.55	24.19	20.94	19.39	17.57	15.82	14.69	13.82	17.83	19.13	19.20	19.44	23.69	20.06
Sept.	29.55	26.55	21.55	22.85	24.07	20.94	19.94	17.19	15.49	14.69	13.82	18.23	19.13	19.20	19.44	23.69	20.31
Oct.	30.85	24.68	21.55	23.43	23.69	20.94	19.94	17.30	15.19	14.69	13.82	18.13	19.13	19.20	19.44	23.69	21.06
Nov.	27.55	23.65	21.80	24.87	23.69	19.69	20.07	17.69	14.94	14.69	13.82	18.13	19.13	20.20	19.69	23.81	21.06
Dec.	26.93	25.05	23.85	25.49	23.69	19.69	20.19	17.69	14.39	14.69	13.82	18.13	19.13	20.20	20.44	23.89	21.06
Aver.	*23.93*	*27.87*	*23.91*	*23.74*	*24.71*	*21.16*	*19.70*	*18.51*	*16.16*	*14.52*	*13.84*	*16.31*	*18.80*	*19.34*	*19.99*	*23.20*	*22.18*

Average daily rate, thousand gross tons


PIG IRON PRODUCTION - UNITED STATES
TOTAL OUTPUT
MERCHANT OUTPUT
Average daily rate, thousand gross tons
140
120
100
80
60
40
20
0
1916 1917 1918 1919 1920 1921 1922 1923 1924 1925 1926 1927 1928 1929 1930 1931 1932 1933 1934 1935 1936
J F M A M J J A S O N D J F M A M J J A S O N D
1937
1938

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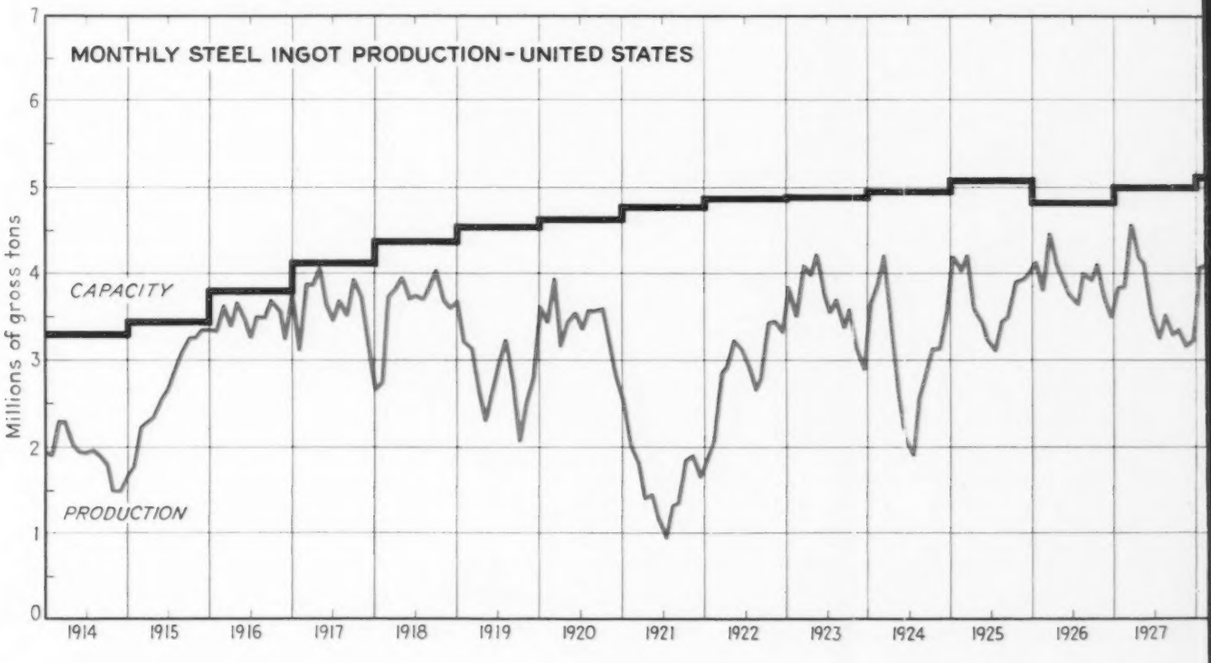
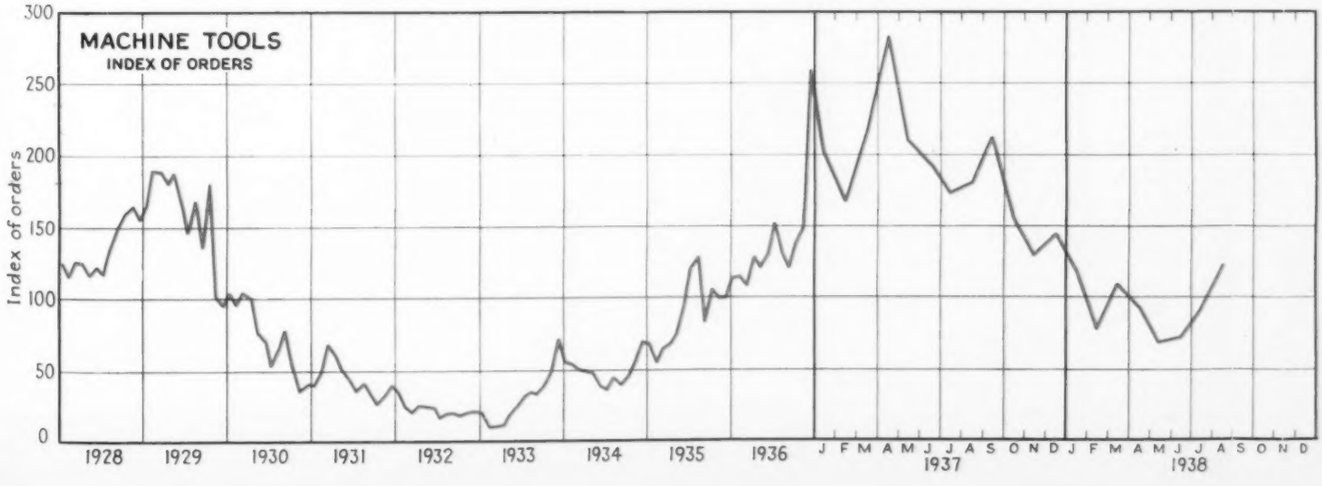
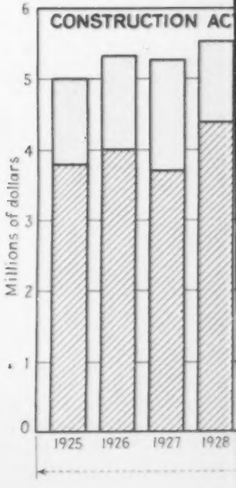


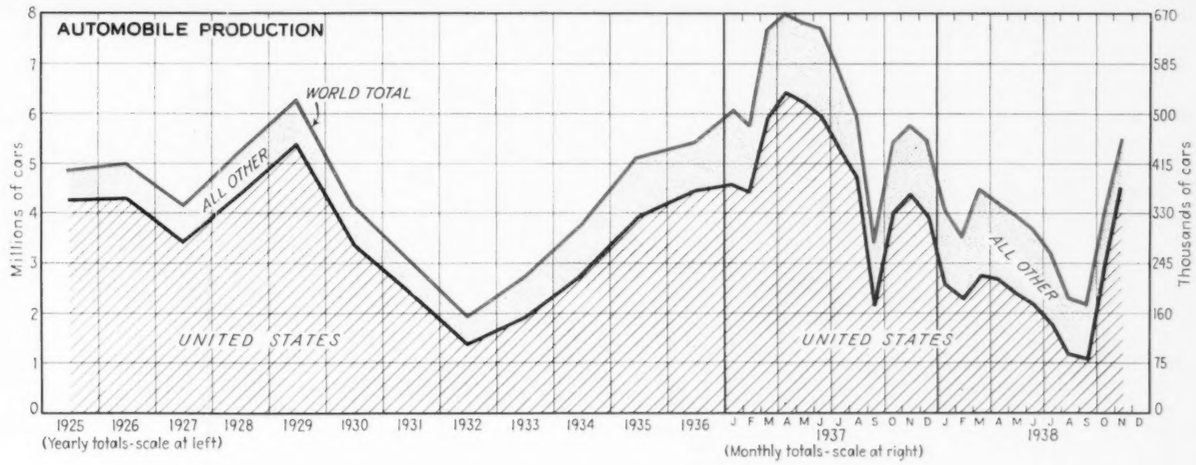


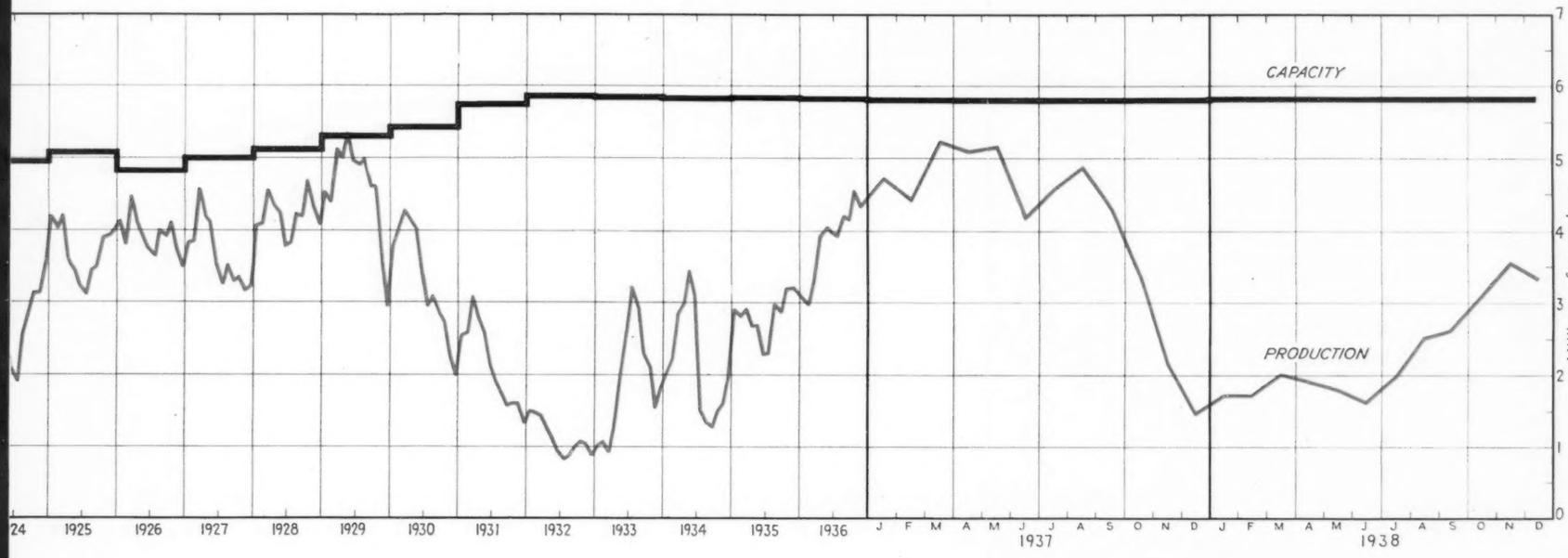


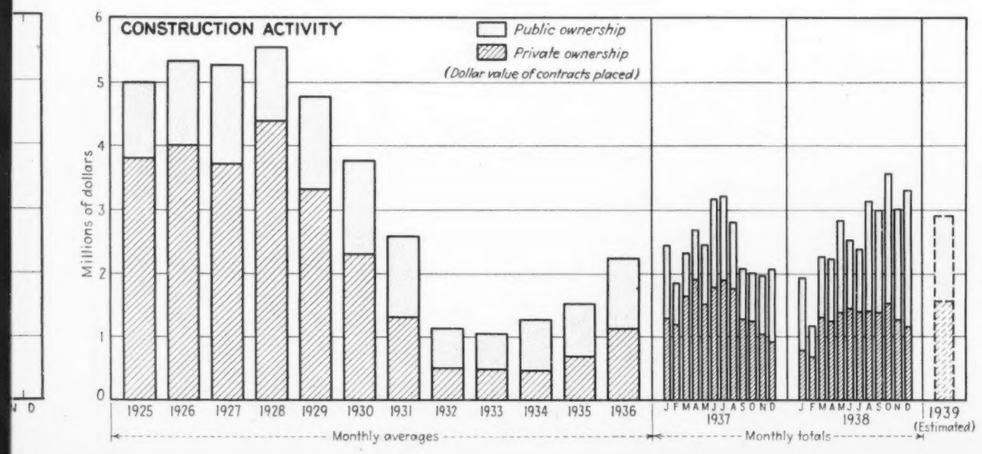
Production Activity

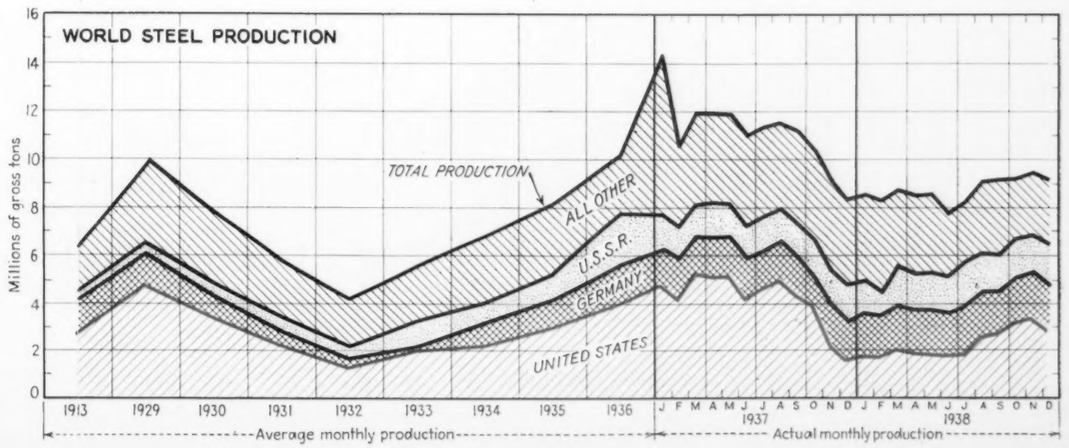
THE six graphs on this page show clearly the changes which have taken place over a number of years in the output of the steel industry and in the activity of various important steel consumers.

Original data sources of the material used in preparing the graphs are as follows: Steel ingot production, pig iron and merchant iron production, and world steel production, THE IRON AGE; construction activity, F. W. Dodge Corp.; machine tool orders, National Machine Tool Builders Association, and world automobile production, International Tin Research and Development Council.









UNIV. OF MICH.

Ferroalloy Quotations

Ferromanganese (80 Per Cent), Gross Ton, at Seaboard

	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938
Jan.	$58 35	$105 00	$108 70	$112 50	$115 00	$100 00	$100 00	$105 00	$100 00	$80 00	$75 00	$68 00	$85 00	$85 00	$75 00	$80 00	$102 50
Feb.	60 42	107 50	107 50	115 00	115 00	100 00	100 00	105 00	95 50	80 00	75 00	68 00	85 00	85 00	75 00	80 00	102 50
March	62 50	113 75	107 50	115 00	97 60	100 00	100 00	105 00	94 00	80 00	75 00	68 00	85 00	85 00	75 00	89 00	102 50
April	64 37	120 00	107 50	115 00	88 00	100 00	100 00	105 00	94 00	80 00	75 00	68 00	85 00	85 00	75 00	95 00	102 50
May	66 87	128 00	107 50	115 00	88 00	94 00	103 00	105 00	94 00	80 00	75 00	68 00	85 00	85 00	75 00	100 62	102 50
June	67 50	128 75	107 50	115 00	88 00	90 00	105 00	105 00	94 00	80 00	68 00	68 00	85 00	85 00	75 00	102 50	102 50
July	67 50	*119 50	106 50	115 00	88 00	90 00	105 00	105 00	94 00	80 00	68 00	82 00	85 00	85 00	75 00	102 50	92 50
Aug.	67 50	117 50	95 75	115 00	88 00	90 00	105 00	105 00	94 00	80 00	68 00	82 00	85 00	85 00	75 00	102 50	92 50
Sept.	75 63	*111 25	90 00	115 00	88 00	90 00	105 00	105 00	94 00	80 00	68 00	82 00	85 00	85 00	75 00	102 50	92 50
Oct.	100 00	*110 00	90 00	115 00	88 00	90 00	105 00	105 00	94 00	80 00	68 00	82 00	85 00	85 00	75 00	102 50	92 50
Nov.	100 00	*108 75	98 75	115 00	96 60	90 00	105 00	105 00	94 00	80 00	68 00	82 00	85 00	85 00	80 00	102 50	92 50
Dec.	100 00	*108 25	107 00	115 00	100 00	100 00	105 00	105 00	82 80	73 60	68 00	82 00	85 00	85 00	80 00	102 50	92 50
Aver.	*74 22*	*114 85*	*102 85*	*114 79*	*95 02*	*94 50*	*103 17*	*105 00*	*93 70*	*79 47*	*70 92*	*75 00*	*85 00*	*85 00*	*75 83*	*96 84*	*97 50*

*Price at furnace, where lower than price at seaboard.

Spiegeleisen (19 to 21 Per Cent), Gross Ton, at Furnace

	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938
Jan.	$26 00	$34 40	$38 00	$33 00	$32 00	$37 00	$30 80	$31 00	$31 00	$28 00	$26 00	$24 00	$27 00	$26 00	$26 00	$26 00	$33 00
Feb.	38 00	35 50	38 00	33 00	32 00	37 00	31 00	31 00	31 00	28 00	26 00	24 00	27 00	26 00	26 00	26 00	33 00
March	29 40	40 00	38 00	33 00	32 00	37 00	31 00	31 00	31 00	28 00	26 00	24 00	26 50	26 00	26 00	28 40	33 00
April	32 25	45 00	36 80	33 00	32 00	37 00	31 00	31 00	31 00	28 00	26 00	24 00	26 00	26 00	26 00	30 00	33 00
May	35 00	52 50	36 00	33 00	32 00	36 25	31 00	31 00	31 00	28 00	26 00	24 00	26 00	26 00	26 00	32 25	33 00
June	36 00	48 50	35 00	32 80	32 00	35 50	31 00	31 00	31 00	28 00	25 75	24 00	26 00	26 00	26 00	33 00	33 00
July	36 00	44 00	34 20	32 00	32 00	33 50	31 00	31 00	31 00	28 00	25 00	27 00	26 00	26 00	26 00	33 00	28 00
Aug.	37 80	46 75	32 50	32 00	32 00	33 00	32 50	31 00	31 00	28 00	25 00	27 00	26 00	26 00	26 00	33 00	28 00
Sept.	38 25	43 75	31 40	31 80	32 00	33 00	33 00	31 00	31 00	28 00	25 00	27 00	26 00	26 00	26 00	33 00	28 00
Oct.	38 00	43 75	30 75	31 25	32 00	30 75	33 00	31 00	31 00	28 00	25 00	27 00	26 00	26 00	26 00	33 00	28 00
Nov.	37 50	41 25	30 25	32 00	37 40	30 00	30 00	31 00	30 50	28 00	24 40	27 00	26 00	26 00	26 00	33 00	28 00
Dec.	37 50	39 00	32 00	32 00	36 50	30 00	31 00	31 00	28 40	26 20	24 00	27 00	26 00	26 00	26 00	33 00	28 00
Aver.	*34 21*	*42 87*	*34 41*	*32 40*	*32 83*	*34 17*	*31 36*	*31 00*	*30 74*	*27 85*	*25 35*	*25 50*	*26 21*	*26 00*	*26 00*	*31 14*	*30 50*

50 Per Cent Ferrosilicon, Carloads, Gross Ton, Delivered East of Mississippi River

	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938
Jan.	$82 50	$75 00	$82 50	$85 00	$85 00	$83 50	$83 50	$83 50	$83 50	$77 50	$74 50	$77 50	$77 50	$77 50	$69 50	$69 50
Feb.	83 75	75 00	82 50	85 00	85 00	83 50	83 50	83 50	83 50	77 50	74 50	77 50	77 50	77 50	69 50	69 50
March	90 00	75 00	82 50	85 00	85 00	83 50	83 50	83 50	83 50	77 50	74 50	77 50	77 50	77 50	69 50	69 50
April	92 50	75 00	82 50	85 00	85 00	83 50	83 50	83 50	83 50	77 50	74 50	77 50	77 50	77 50	69 50	69 50
May	94 50	75 00	82 50	85 00	85 00	83 50	83 50	83 50	83 50	77 50	74 50	77 50	77 50	77 50	69 50	69 50
June	90 00	75 00	82 50	85 00	85 00	83 50	83 50	83 50	83 50	77 50	74 50	77 50	77 50	77 50	69 50	69 50
July	82 50	71 00	82 50	85 00	85 00	83 50	83 50	83 50	83 50	77 50	74 50	77 50	77 50	69 50	69 50	69 50
Aug.	82 50	71 25	82 50	85 00	85 00	83 50	83 50	83 50	83 50	77 50	74 [illegible]	77 50	77 50	69 50	69 50	69 50
Sept.	82 50	72 00	82 50	85 00	85 00	83 50	83 50	83 50	83 50	77 50	74 50	77 50	77 50	69 50	69 50	69 50
Oct.	81 00	71 00	82 50	85 00	85 00	83 50	83 50	83 50	83 50	77 50	74 50	77 50	77 50	69 50	69 50	69 50
Nov.	80 63	70 00	82 50	85 00	85 00	83 50	83 50	83 50	83 50	77 50	74 50	77 50	77 50	69 50	69 50	69 50
Dec.	76 25	75 00	82 50	85 00	85 00	83 50	83 50	83 50	83 50	77 50	74 50	77 50	77 50	69 50	69 50	69 50
Aver.	*84 89*	*73 35*	*82 80*	*85 00*	*85 00*	*83 50*	*83 50*	*83 50*	*83 50*	*77 50*	*74 50*	*77 50*	*77 50*	*73 50*	*69 50*	*69 50*

Coke Prices

Prompt Connellsville Furnace Coke, Net Ton at Oven

	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938
Jan.	$5 65	$6 00	$5 06	$2 75	$8 05	$3 94	$3 94	$7 19	$3 50	$2 70	$2 75	$2 55	$2 50	$2 25	$1 75	$3 60	$3 85	$3 65	$4 00	$4.00
Feb.	4 44	6 00	4 50	3 04	7 13	4 08	3 63	7 31	3 38	2 68	2 90	2 60	2 50	2 25	1 75	3 50	3 85	3 65	4 06	4.00
March	4 06	6 00	4 35	3 25	7 25	4 08	3 35	3 05	3 35	2 60	2 98	2 60	2 50	2 25	1 75	3 50	3 85	3 65	4 25	4.00
April	3 65	9 60	3 50	4 48	6 31	3 75	3 04	3 00	3 20	2 60	2 78	2 60	2 50	2 25	1 75	3 85	3 85	3 65	4 51	4.00
May	3 69	12 00	3 25	6 00	5 15	3 25	3 00	2 91	2 94	2 60	2 75	2 53	2 45	2 20	1 75	3 85	3 85	3 65	4 60	4.00
June	4 00	15 00	3 00	6 75	4 75	3 19	2 77	2 83	2 93	2 60	2 75	2 50	2 40	2 00	1 81	3 85	3 59	3 65	4 58	3.85
July	4 07	17 20	2 81	10 75	4 55	3 00	2 83	2 84	3 00	2 63	2 75	2 50	2 40	2 00	2 31	3 85	3 27	3 50	4 35	3.75
Aug.	4 31	17 75	2 75	12 80	4 56	3 00	3 06	2 95	3 00	2 75	2 73	2 58	2 40	2 00	2 55	3 85	3 29	3 61	4 35	3.75
Sept.	4 56	16 70	3 15	11 13	4 50	3 00	3 49	3 38	2 85	2 75	2 65	2 60	2 40	2 00	2 50	3 85	3 25	3 69	4 27	3.75
Oct.	4 52	15 12	3 28	9 60	3 85	3 00	6 13	3 63	2 85	2 83	2 65	2 60	2 40	1 81	3 50	3 85	3 53	3 75	4 25	3.75
Nov.	5 87	8 26	3 03	7 19	3 81	3 04	5 75	4 43	2 77	2 75	2 65	2 53	2 40	1 75	3 75	3 85	3 60	3 75	4 25	3.75
Dec.	6 12	6 20	2 75	7 00	4 00	3 68	4 32	3 50	2 75	2 75	2 63	2 50	2 34	1 75	3 75	3 85	3 57	3 92	4 00	3.75
Aver.	*4 58*	*11 32*	*3 45*	*7 01*	*5 33*	*3 42*	*3 78*	*3 92*	*3 04*	*2 69*	*2 75*	*2 56*	*2 43*	*2 04*	*2 41*	*3 79*	*3 61*	*3 68*	*4 29*	*3 86*

Prompt Connellsville Foundry Coke, Net Ton at Oven

	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938
Jan.	$6 25	$7 00	$6 38	$3 75	$8 70	$4 75	$4 88	$7 75	$4 50	$3 75	$3 75	$3 50	$3 50	$3 50	$2 50	$4 25	$4 60	$4 25	$4 50	$5.00
Feb.	5 00	7 00	5 63	4 00	8 25	4 88	4 31	8 31	4 31	3 75	3 75	3 50	3 50	3 50	2 50	4 25	4 60	4 25	4 50	5.00
March	4 94	7 00	5 45	4 25	8 38	4 88	4 15	4 40	4 40	3 75	3 75	3 50	3 50	3 50	2 50	4 25	4 60	4 25	4 50	5.00
April	4 30	10 20	4 75	5 06	7 56	4 75	4 00	4 06	4 06	3 75	3 75	3 50	3 50	3 50	2 50	4 60	4 60	4 25	5 00	5.00
May	4 31	13 00	4 50	6 30	6 15	4 69	4 00	4 00	4 00	3 75	3 75	3 50	3 50	3 10	2 50	4 60	4 60	4 25	5 25	5.00
June	4 56	15 75	4 45	7 25	5 56	4 38	4 80	4 00	4 00	3 75	3 75	3 50	3 50	3 00	2 56	4 60	4 15	4 25	5 25	4.85
July	5 00	17 80	4 06	11 00	5 35	4 10	3 75	4 00	4 00	3 75	3 75	3 50	3 50	3 00	2 94	4 60	3 88	4 00	5 00	4.75
Aug.	5 25	18 88	3 75	13 90	5 38	4 00	3 88	4 00	4 00	3 75	3 75	3 50	3 50	2 90	3 15	4 60	4 60	4 00	5 00	4.75
Sept.	5 80	17 70	4 15	12 50	5 50	4 00	4 25	4 38	4 00	3 75	3 75	3 50	3 50	2 75	3 25	4 60	4 00	4 05	5 00	4.75
Oct.	6 25	17 38	4 38	11 70	4 80	4 00	6 31	4 63	4 00	3 75	3 75	3 50	3 50	2 75	4 05	4 60	4 20	4 25	5 00	4.75
Nov.	7 00	9 50	4 19	8 38	4 81	4 06	6 81	5 50	3 85	3 75	3 75	3 50	3 50	2 75	4 25	4 60	4 25	4 25	5 00	4.75
Dec.	7 00	7 00	3 81	7 88	4 81	4 55	5 20	4 50	3 75	3 75	3 50	3 50	3 25	2 69	4 25	4 60	4 15	4 40	5 00	4.75
Aver.	*5 47*	*12 27*	*4 63*	*8 00*	*6 27*	*4 42*	*4 61*	*4 96*	*4 11*	*3 75*	*3 73*	*3 50*	*3 48*	*3 08*	*3 08*	*4 51*	*4 30*	*4 20*	*4 92*	*4 86*

Monthly Average Steel Prices Computed From Weekly

Composite Price of

AVERAGE of THE IRON AGE quotations on steel bars, shapes, plates, plain wire, open hearth rails, black pipe and black sheets for period prior to 1920; hot-rolled strip added for subsequent period. A new method of pricing flat-rolled products made effective May 18, 1938, necessitated substituting the price of No. 10 hot-rolled sheets for the

	1903	1904	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920
Jan.	1.921	1.740	1.713	1.747	1.887	1.923	1.820	1.741	1.615	1.424	1.771	1.451	1.383	2.060	3.384	3.549	3.371	3.534
Feb.	1.875	1.751	1.725	1.749	1.899	1.920	1.772	1.736	1.620	1.400	1.766	1.477	1.395	2.203	3.501	3.549	3.371	3.534
March	1.886	1.769	1.783	1.746	1.905	1.920	1.599	1.727	1.623	1.394	1.786	1.473	1.413	2.447	3.739	3.549	3.282	3.802
April	1.886	1.764	1.793	1.741	1.931	1.920	1.577	1.727	1.627	1.433	1.790	1.446	1.437	2.611	4.110	3.549	3.031	3.956
May	1.886	1.757	1.799	1.741	1.933	1.920	1.506	1.720	1.620	1.456	1.727	1.424	1.433	2.750	4.562	3.549	3.021	3.890
June	1.886	1.737	1.779	1.763	1.927	1.851	1.506	1.707	1.556	1.470	1.687	1.399	1.444	2.689	5.004	3.549	3.021	3.849
July	1.884	1.702	1.779	1.763	1.927	1.820	1.543	1.657	1.546	1.504	1.667	1.400	1.471	2.640	5.334	3.549	3.021	3.915
Aug.	1.879	1.674	1.783	1.763	1.927	1.820	1.581	1.636	1.539	1.553	1.624	1.446	1.511	2.682	5.249	3.549	3.021	3.997
Sept.	1.871	1.621	1.786	1.763	1.934	1.820	1.616	1.627	1.513	1.610	1.591	1.470	1.559	2.765	5.049	3.549	3.004	3.954
Oct.	1.867	1.620	1.720	1.780	1.934	1.820	1.664	1.613	1.441	1.659	1.559	1.446	1.634	2.856	3.470	3.549	3.052	3.761
Nov.	1.812	1.652	1.723	1.820	1.934	1.820	1.674	1.613	1.407	1.700	1.505	1.397	1.769	3.021	3.444	3.549	3.084	3.569
Dec.	1.761	1.691	1.727	1.870	1.934	1.820	1.727	1.611	1.399	1.725	1.463	1.366	1.941	3.278	3.441	3.461	3.110	3.081
Aver.	*1.868*	*1.707*	*1.760*	*1.770*	*1.923*	*1.865*	*1.632*	*1.676*	*1.542*	*1.527*	*1.661*	*1.433*	*1.533*	*2.667*	*4.191*	*3.542*	*3.115*	*3.737*

Open-Hearth Steel Billets at Pittsburgh, Gross Ton

	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938
Jan.	$28.00	$37.50	$40.00	$38.00	$35.00	$35.00	$33.00	$33.00	$34.00	$30.00	$27.75	$26.00	$26.00	$27.00	$29.00	$34.00	$37.00
Feb.	28.00	39.63	40.00	38.00	35.00	33.00	33.00	33.25	33.00	30.00	27.00	26.00	26.00	27.00	29.00	34.00	37.00
March	28.00	44.39	40.00	36.70	35.00	34.00	33.00	34.00	33.00	30.00	27.00	26.00	26.00	27.00	28.20	36.40	37.00
April	29.50	45.00	40.00	35.50	35.00	33.25	33.00	34.80	33.00	30.00	27.00	26.00	26.75	27.00	28.00	37.00	37.00
May	34.00	45.00	38.50	35.25	35.00	33.00	33.00	36.00	32.50	29.50	27.00	26.00	29.00	27.00	28.00	37.00	37.00
June	35.00	42.63	38.00	35.00	35.00	33.00	32.25	35.25	31.00	29.00	26.50	26.00	29.00	27.00	28.00	37.00	36.40
July	35.00	42.50	38.00	35.00	35.00	33.00	32.00	35.00	31.00	29.00	26.00	26.00	27.40	27.00	30.00	37.00	34.00
Aug.	35.50	42.50	37.75	35.00	35.00	33.00	32.00	35.00	31.00	29.00	26.00	26.00	27.00	27.00	30.00	37.00	34.00
Sept.	39.50	41.88	36.40	35.00	35.00	33.00	32.00	35.00	31.00	29.00	26.00	26.00	27.00	27.00	30.00	37.00	34.00
Oct.	40.00	40.00	35.75	34.25	35.00	33.00	32.80	35.00	31.00	29.00	26.00	26.00	27.00	27.00	32.00	37.00	34.00
Nov.	37.75	40.00	35.50	34.75	35.00	33.00	33.00	35.00	31.00	29.00	26.00	26.00	27.00	28.00	32.00	37.00	34.00
Dec.	36.50	44.00	36.00	35.00	35.00	33.00	33.00	34.60	30.60	28.80	26.00	26.00	27.00	29.00	32.00	37.00	34.00
Aver.	*33.90*	*41.76*	*37.99*	*35.62*	*35.00*	*33.27*	*32.67*	*34.66*	*31.84*	*29.36*	*26.51*	*26.00*	*27.10*	*27.25*	*29.68*	*36.45*	*35.45*

Wire Rods at Pittsburgh, Gross Ton

Quotations apply to both open-hearth and bessemer rods

	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938
Jan.	$36.00	$47.00	$51.00	$48.00	$45.00	$45.00	$41.60	$42.00	$40.00	$35.00	$37.00	$35.80	$36.00	$38.00	$40.00	$43.00	$47.00
Feb.	35.75	49.38	51.00	48.00	45.00	43.00	43.00	42.00	39.75	35.00	37.00	35.00	36.00	38.00	40.00	43.00	47.00
March	36.00	50.00	51.00	48.00	45.00	43.00	44.00	42.00	38.00	35.00	37.00	35.00	36.00	38.00	38.40	46.20	47.00
April	38.00	50.25	51.00	47.00	45.00	42.25	44.00	42.00	38.00	35.00	37.00	35.00	36.50	38.00	38.00	47.00	47.00
May	38.00	51.00	48.75	46.00	45.00	42.00	44.00	42.00	36.00	35.00	37.00	35.00	38.00	38.00	38.00	47.00	47.00
June	38.50	51.00	48.00	45.60	45.00	42.00	42.00	42.00	36.00	35.00	37.00	35.00	38.00	38.00	38.00	47.00	46.20
July	40.00	51.00	48.00	45.00	45.00	42.25	42.00	42.00	36.00	35.00	37.00	35.00	38.00	38.00	38.00	47.00	43.00
Aug.	42.40	51.00	46.50	45.00	45.00	43.00	42.00	42.00	36.00	35.00	37.00	35.00	38.00	38.00	38.00	47.00	43.00
Sept.	46.25	51.00	46.00	45.00	45.00	43.00	42.00	42.00	36.00	35.00	37.00	35.00	38.00	38.00	38.00	47.00	43.00
Oct.	45.00	51.00	45.50	45.00	45.00	42.75	42.00	40.00	36.00	35.00	37.00	35.00	38.00	38.00	40.00	47.00	43.00
Nov.	45.00	51.00	45.00	45.00	45.00	41.00	42.00	40.00	36.00	35.00	37.00	35.00	38.00	38.50	40.00	47.00	43.00
Dec.	45.00	51.00	48.00	45.00	45.00	40.00	42.00	40.00	35.20	35.40	37.00	36.00	38.00	40.00	43.00	47.00	43.00
Aver.	*40.49*	*50.89*	*48.81*	*46.05*	*45.00*	*42.44*	*42.55*	*41.50*	*36.91*	*35.03*	*37.00*	*35.15*	*37.37*	*38.21*	*39.12*	*46.27*	*44.93*

Steel Rails at Mill, Open-Hearth, Gross Ton

	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938
Jan.	$40.00	$43.00	$43.00	$43.00	$43.00	$43.00	$43.00	$43.00	$43.00	$43.00	$43.00	$40.00	$36.37	$36.37	$36.37	$39.00	$42.50
Feb.	40.00	43.00	43.00	43.00	43.00	43.00	43.00	43.00	43.00	43.00	43.00	40.00	36.37	36.37	36.37	39.00	42.50
March	40.00	43.00	43.00	43.00	43.00	43.00	43.00	43.00	43.00	43.00	43.00	40.00	36.37	36.37	36.37	41.80	42.50
April	40.00	43.00	43.00	43.00	43.00	43.00	43.00	43.00	43.00	43.00	43.00	40.00	36.37	36.37	36.37	42.50	42.50
May	40.00	43.00	43.00	43.00	43.00	43.00	43.00	43.00	43.00	43.00	43.00	40.00	36.37	36.37	36.37	42.50	42.50
June	40.00	43.00	43.00	43.00	43.00	43.00	43.00	43.00	43.00	43.00	43.00	40.00	36.37	36.37	36.37	42.50	42.50
July	40.00	43.00	43.00	43.00	43.00	43.00	43.00	43.00	43.00	43.00	43.00	40.00	36.37	36.37	36.37	42.50	42.50
Aug.	40.00	43.00	43.00	43.00	43.00	43.00	43.00	43.00	43.00	43.00	43.00	40.00	36.37	36.37	36.37	42.50	42.50
Sept.	40.00	43.00	43.00	43.00	43.00	43.00	43.00	43.00	43.00	43.00	43.00	40.00	36.37	36.37	36.37	42.50	41.25
Oct.	43.00	43.00	43.00	43.00	43.00	43.00	43.00	43.00	43.00	43.00	42.25	39.55	36.37	36.37	36.37	42.50	40.00
Nov.	43.00	43.00	43.00	43.00	43.00	43.00	43.00	43.00	43.00	43.00	40.00	36.38	36.37	36.37	36.37	42.50	40.00
Dec.	43.00	43.00	43.00	43.00	43.00	43.00	43.00	43.00	43.00	43.00	40.00	36.38	36.37	36.37	39.00	42.50	40.00
Aver.	*40.75*	*43.00*	*43.00*	*43.00*	*43.00*	*43.00*	*43.00*	*43.00*	*43.00*	*43.00*	*42.44*	*39.86*	*36.37*	*36.37*	*36.59*	*41.86*	*41.77*

Structural Shapes at Pittsburgh, Cents a Pound

	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938
Jan.	2.80	2.47	2.45	1.50	2.06	2.50	2.10	1.90	1.98	1.81	1.90	1.83	1.64	1.50	1.60	1.70	1.80	1.80	2.05	2.25
Feb.	2.80	2.70	2.26	1.39	2.20	2.50	2.10	1.90	1.90	1.85	1.90	1.80	1.65	1.50	1.60	1.70	1.80	1.80	2.05	2.25
March	2.71	3.13	2.08	1.39	2.39	2.39	2.10	1.90	1.90	1.85	1.90	1.80	1.65	1.52	1.60	1.70	1.80	1.80	2.21	2.25
April	2.45	3.25	2.10	1.50	2.50	2.29	2.05	1.90	1.88	1.85	1.95	1.80	1.65	1.60	1.60	1.74	1.80	1.80	2.25	2.25
May	2.45	3.10	2.20	1.56	2.50	2.24	2.00	1.90	1.80	1.85	1.95	1.73	1.65	1.60	1.60	1.85	1.80	1.80	2.25	2.25
June	2.45	3.10	2.10	1.63	2.50	2.20	2.00	1.94	1.80	1.85	1.95	1.69	1.65	1.60	1.60	1.85	1.80	1.80	2.25	2.22
July	2.45	3.10	1.93	1.70	2.50	2.09	2.00	2.00	1.80	1.85	1.95	1.65	1.63	1.60	1.60	1.81	1.80	1.90	2.25	2.10
Aug.	2.45	3.10	1.82	1.88	2.50	2.00	1.95	2.00	1.80	1.90	1.95	1.61	1.60	1.60	1.60	1.80	1.80	1.90	2.25	2.10
Sept.	2.45	3.10	1.64	2.00	2.50	2.00	1.90	2.00	1.78	1.90	1.95	1.60	1.60	1.60	1.60	1.80	1.80	1.90	2.25	2.10
Oct.	2.45	3.05	1.60	2.00	2.50	1.93	1.90	2.00	1.75	1.90	1.90	1.60	1.60	1.60	1.70	1.80	1.80	1.90	2.25	2.10
Nov.	2.45	2.89	1.54	2.00	2.50	2.00	1.90	2.00	1.77	1.90	1.90	1.60	1.60	1.60	1.70	1.80	1.80	1.90	2.25	2.10
Dec.	2.45	2.45	1.50	2.00	2.50	2.10	1.90	2.00	1.80	1.90	1.90	1.60	1.50	1.60	1.70	1.80	1.80	1.90	2.25	2.10
Aver.	*2.52*	*2.95*	*1.94*	*1.71*	*2.43*	*2.19*	*1.99*	*1.95*	*1.83*	*1.87*	*1.92*	*1.69*	*1.62*	*1.57*	*1.68*	*1.78*	*1.80*	*1.85*	*2.21*	*2.17*

Market Quotations Published In THE IRON AGE

Finished Steel

price of No. 24 gage hot-rolled annealed sheets which was previously used in computing the composite price. The composite price published herewith has been computed back to 1920 on this new basis; previous data are based on No. 24 gage hot-rolled annealed sheets.

	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938
Jan.	2.988	1.959	2.400	2.746	2.409	2.323	2.281	2.136	2.192	2.162	1.976	1.879	1.885	1.945	2.056	2.062	2.249	2.512
Feb.	2.850	1.902	2.534	2.721	2.421	2.315	2.221	2.170	2.192	2.148	1.981	1.877	1.873	1.945	2.056	2.040	2.249	2.512
March	2.684	1.902	2.673	2.662	2.424	2.322	2.234	2.178	2.192	2.147	1.981	1.879	1.867	1.945	2.056	2.021	2.459	2.512
April	2.638	1.969	2.776	2.592	2.362	2.318	2.226	2.177	2.223	2.097	1.974	1.908	1.817	1.988	2.056	2.028	2.512	2.512
May	2.650	2.030	2.772	2.552	2.328	2.304	2.216	2.154	2.226	2.055	1.974	1.908	1.802	2.118	2.056	2.028	2.512	2.506
June	2.524	2.086	2.746	2.501	2.305	2.308	2.211	2.154	2.236	2.041	1.964	1.908	1.820	2.118	2.056	2.033	2.512	2.459
July	2.366	2.118	2.746	2.450	2.303	2.315	2.209	2.144	2.228	2.018	1.955	1.914	1.878	2.056	2.056	2.091	2.512	2.300
Aug.	2.222	2.014	2.746	2.395	2.284	2.315	2.209	2.161	2.214	1.998	1.945	1.914	1.883	2.056	2.056	2.091	2.512	2.300
Sept.	2.153	2.352	2.746	2.356	2.261	2.315	2.200	2.161	2.208	1.988	1.945	1.915	1.890	2.056	2.056	2.096	2.512	2.293
Oct.	2.113	2.398	2.746	2.337	2.276	2.315	2.152	2.170	2.197	1.981	1.944	1.911	1.950	2.056	2.062	2.116	2.512	2.255
Nov.	2.055	2.392	2.746	2.353	2.311	2.315	2.131	2.181	2.192	1.978	1.939	1.898	1.933	2.056	2.062	2.116	2.512	2.286
Dec.	2.001	2.371	2.731	2.399	2.328	2.315	2.133	2.187	2.204	1.964	1.910	1.898	1.945	2.056	2.062	2.199	2.512	2.286
Aver.	*2.437*	*2.124*	*2.697*	*2.506*	*2.334*	*2.315*	*2.202*	*2.165*	*2.209*	*2.048*	*1.957*	*1.901*	*1.879*	*2.053*	*2.058*	*2.077*	*2.464*	*2.394*

Plates at Pittsburgh, Cents a Pound

	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938
Jan.	3.00	2.72	2.65	1.48	2.06	2.50	2.00	1.86	1.90	1.81	1.90	1.83	1.64	1.50	1.60	1.70	1.80	1.80	2.05	2.25
Feb.	3.00	3.50	2.33	1.39	2.23	2.45	2.00	1.80	1.86	1.85	1.90	1.80	1.65	1.50	1.60	1.70	1.80	1.80	2.05	2.25
March	2.91	3.63	2.04	1.39	2.39	2.39	2.00	1.86	1.85	1.85	1.90	1.80	1.65	1.52	1.60	1.70	1.80	1.80	2.21	2.25
April	2.65	3.75	2.10	1.48	2.50	2.28	2.00	1.90	1.85	1.85	1.95	1.80	1.65	1.60	1.55	1.74	1.80	1.80	2.25	2.25
May	2.65	3.75	2.20	1.56	2.50	2.20	2.00	1.86	1.84	1.85	1.95	1.73	1.65	1.60	1.50	1.85	1.80	1.80	2.25	2.25
June	2.65	3.55	1.95	1.63	2.50	2.18	1.92	1.88	1.80	1.85	1.95	1.69	1.65	1.60	1.53	1.85	1.80	1.80	2.25	2.22
July	2.65	3.38	1.85	1.70	2.50	2.09	1.90	1.90	1.80	1.85	1.95	1.65	1.63	1.60	1.60	1.81	1.80	1.90	2.25	2.10
Aug.	2.65	3.25	1.78	1.88	2.50	1.95	1.85	1.90	1.80	1.90	1.95	1.61	1.60	1.60	1.60	1.80	1.80	1.90	2.25	2.10
Sept.	2.53	3.25	1.64	2.13	2.50	1.82	1.80	1.90	1.78	1.90	1.95	1.60	1.60	1.60	1.60	1.80	1.80	1.90	2.25	2.10
Oct.	2.61	3.09	1.60	2.11	2.50	1.80	1.80	1.90	1.75	1.90	1.94	1.60	1.60	1.60	1.70	1.80	1.80	1.90	2.25	2.10
Nov.	2.65	2.81	1.54	1.99	2.50	1.83	1.86	1.90	1.77	1.90	1.90	1.60	1.60	1.60	1.70	1.80	1.80	1.90	2.25	2.10
Dec.	2.65	2.65	1.50	1.95	2.50	1.92	1.90	1.90	1.80	1.90	1.90	1.60	1.54	1.60	1.70	1.80	1.80	1.90	2.25	2.10
Aver.	*2.78*	*3.28*	*1.93*	*1.72*	*2.43*	*2.12*	*1.91*	*1.88*	*1.82*	*1.87*	*1.93*	*1.69*	*1.62*	*1.57*	*1.61*	*1.78*	*1.80*	*1.85*	*2.21*	*2.17*

Soft Steel Bars at Pittsburgh, Cents a Pound

	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938
Jan.	2.70	2.75	2.35	1.50	2.04	2.40	2.10	2.00	1.98	1.81	1.90	1.89	1.64	1.50	1.60	1.75	1.80	1.85	2.20	2.45
Feb.	2.70	3.00	2.15	1.39	2.20	2.40	2.10	2.00	1.90	1.85	1.90	1.85	1.65	1.50	1.60	1.75	1.80	1.85	2.20	2.45
March	2.61	3.63	2.00	1.39	2.39	2.40	2.10	2.00	1.90	1.85	1.90	1.85	1.65	1.52	1.60	1.75	1.80	1.85	2.40	2.45
April	2.35	3.75	2.05	1.50	2.50	2.29	2.05	2.00	1.89	1.85	1.95	1.79	1.65	1.60	1.60	1.79	1.80	1.85	2.45	2.45
May	2.35	3.63	2.10	1.58	2.40	2.24	2.00	1.95	1.85	1.85	1.95	1.75	1.65	1.60	1.60	1.90	1.80	1.85	2.45	2.45
June	2.35	3.50	2.05	1.70	2.40	2.20	2.00	2.00	1.81	1.85	1.95	1.73	1.65	1.60	1.60	1.90	1.80	1.85	2.45	2.41
July	2.35	3.50	1.84	1.70	2.40	2.15	2.00	2.00	1.80	1.85	1.95	1.65	1.63	1.60	1.60	1.82	1.80	1.95	2.45	2.25
Aug.	2.35	3.25	1.74	1.88	2.40	2.13	1.95	2.00	1.80	1.90	1.95	1.64	1.60	1.60	1.60	1.80	1.80	1.95	2.45	2.25
Sept.	2.35	3.25	1.63	2.00	2.40	2.04	1.92	2.00	1.78	1.90	1.94	1.61	1.60	1.60	1.60	1.80	1.80	1.97	2.45	2.25
Oct.	2.39	3.13	1.55	2.00	2.40	2.00	2.00	2.00	1.75	1.91	1.90	1.60	1.60	1.60	1.75	1.80	1.85	2.05	2.45	2.25
Nov.	2.69	2.87	1.50	2.00	2.40	2.03	2.00	2.00	1.77	1.94	1.90	1.60	1.60	1.60	1.75	1.80	1.85	2.05	2.45	2.25
Dec.	2.75	2.35	1.50	2.00	2.40	2.10	2.00	2.00	1.80	1.90	1.90	1.60	1.58	1.60	1.75	1.80	1.85	2.05	2.45	2.25
Aver.	*2.50*	*3.22*	*1.87*	*1.72*	*2.36*	*2.20*	*2.02*	*2.00*	*1.84*	*1.87*	*1.92*	*1.71*	*1.63*	*1.57*	*1.64*	*1.81*	*1.81*	*1.93*	*2.40*	*2.35*

No. 24 Gage Galvanized Sheets, at Pittsburgh, Cents a Pound

	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938
Jan.	6.05	5.33	5.70	4.00	4.35	4.98	4.75	4.60	3.78	3.65	3.60	3.33	2.90	2.80	2.68	2.85	3.10	3.10	3.40	3.80
Feb.	6.05	6.50	5.56	4.00	4.54	5.00	4.75	4.53	3.71	3.65	3.60	3.30	2.90	2.75	2.50	2.85	3.10	3.10	3.40	3.80
March	5.96	7.00	5.05	4.00	4.93	4.93	4.62	4.50	3.65	3.65	3.60	3.30	2.90	2.85	2.60	2.85	3.10	3.10	3.72	3.80
April	5.70	7.00	4.88	4.11	5.25	4.88	4.45	4.50	3.63	3.65	3.60	3.30	2.84	2.85	2.63	2.95	3.10	3.10	3.80	3.80
May	5.70	7.00	5.00	4.15	5.20	4.80	4.29	4.43	3.72	3.58	3.60	3.23	2.80	2.85	2.70	3.25	3.10	3.10	3.80	3.80
June	5.70	7.00	4.88	4.15	5.00	4.76	4.21	4.28	3.85	3.50	3.60	3.19	2.74	2.85	2.70	3.25	3.10	3.10	3.80	3.68
July	5.70	8.25	4.31	4.15	5.00	4.56	4.19	4.24	3.85	3.46	3.60	3.13	2.90	2.85	2.85	3.13	3.10	3.20	3.80	3.50
Aug.	5.70	9.00	3.90	4.23	5.00	5.55	4.20	4.23	3.85	3.40	3.50	3.05	2.90	2.81	2.85	3.10	3.10	3.20	3.80	3.50
Sept.	5.70	8.88	3.81	4.35	5.00	4.60	4.20	*3.83	3.85	3.40	3.50	3.00	2.90	2.75	2.85	3.10	3.10	3.20	3.80	3.50
Oct.	5.70	8.18	4.00	4.50	5.00	4.60	4.23	3.85	3.76	3.50	3.50	2.99	2.90	2.85	2.85	3.10	3.10	3.20	3.80	3.45
Nov.	5.70	7.04	3.86	4.43	4.93	4.60	4.50	3.85	3.66	3.50	3.48	2.95	2.90	2.85	2.85	3.10	3.10	3.20	3.80	3.50
Dec.	5.70	5.70	4.00	4.35	4.89	4.72	4.60	3.85	3.63	3.58	3.40	2.92	2.86	2.85	2.85	3.10	3.10	3.40	3.80	3.50
Aver.	*5.78*	*7.24*	*4.58*	*4.20*	*4.92*	*4.75*	*4.42*	*3.89*	*3.75*	*3.54*	*3.55*	*3.14*	*2.87*	*2.83*	*2.74*	*3.05*	*3.10*	*3.17*	*3.73*	*3.64*

*No. 24 gage was made the base in September, 1926. Quotations prior to that time are for No. 28 gage, for which there is now an extra of 50c. per 100 lb.

Cold-Finished Steel Bars at Pittsburgh, Cents a Pound

	1930	1931	1932	1933	1934	1935	1936	1937	1938
Jan.	$2.15	$2.08	$2.00	$1.70	$2.10	$2.10	$2.10	$2.55	$2.90
Feb.	2.10	2.10	2.00	1.70	2.10	2.10	2.10	2.55	2.90
March	2.10	2.10	2.00	1.70	2.10	2.10	2.10	2.83	2.90
April	2.10	2.10	2.00	1.70	2.10	2.01	2.10	2.90	2.90
May	2.10	2.10	1.82	1.70	2.10	1.95	2.10	2.90	2.90
June	2.10	2.10	1.70	1.70	2.10	1.95	2.10	2.90	2.70
July	2.10	2.10	1.70	1.70	2.10	1.95	2.25	2.90	2.70
Aug.	2.10	2.10	1.70	1.70	2.10	1.95	2.25	2.90	2.70
Sept.	2.10	2.10	1.70	1.95	2.10	1.95	2.25	2.90	2.70
Oct.	2.10	2.10	1.70	1.95	2.10	1.95	2.35	2.90	2.70
Nov.	2.00	2.10	1.70	1.95	2.10	1.95	2.35	2.90	2.70
Dec.	2.00	2.02	1.70	2.10	2.10	1.95	2.35	2.90	2.70
Aver.	*2.09*	*2.09*	*1.81*	*1.80*	*2.10*	*1.99*	*2.20*	*2.84*	*2.78*

Large Structural Rivets at Pittsburgh, Dollars a CWT

	1930	1931	1932	1933	1934	1935	1936	1937	1938
Jan.	$3.10	$2.75	$2.25	$2.25	$2.75	$2.90	$2.90	$3.25	$3.60
Feb.	3.10	2.75	2.25	2.25	2.75	2.90	2.90	3.25	3.60
March	3.10	2.75	2.25	2.25	2.75	2.90	2.90	3.53	3.60
April	3.10	2.75	2.25	2.25	2.88	2.90	2.90	3.60	3.60
May	2.95	2.75	2.25	2.25	3.00	2.90	2.90	3.60	3.60
June	2.90	2.75	2.25	2.38	3.00	2.90	2.90	3.60	3.60
July	2.90	2.75	2.25	2.50	2.92	2.90	3.05	3.60	3.40
Aug.	2.79	2.75	2.25	2.50	2.90	2.90	3.05	3.60	3.40
Sept.	2.75	2.55	2.25	2.50	2.90	2.90	3.05	3.60	3.40
Oct.	2.75	2.25	2.25	2.65	2.90	2.90	3.05	3.60	3.40
Nov.	2.75	2.25	2.25	2.75	2.90	2.90	3.05	3.60	3.40
Dec.	2.75	2.25	2.25	2.75	2.90	2.90	3.21	3.60	3.40
Aver.	*2.91*	*2.61*	*2.25*	*2.44*	*2.88*	*2.90*	*2.99*	*3.54*	*3.50*

Hot-Rolled Strip Steel, at Pittsburgh, Cents a Pound

(Prices quoted only on strip wider than 6-in. prior to June 1, 1932.)

	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938
Jan.	3.30	2.00	2.75	3.00	2.25	2.30	2.34	2.01	1.80	1.80	1.55	1.41	1.45	1.75	1.85	1.85	2.15	2.40
Feb.	3.11	1.84	2.86	3.00	2.35	2.30	2.21	2.08	1.80	1.80	1.55	1.40	1.45	1.75	1.85	1.85	2.15	2.40
March	2.93	1.81	3.18	2.93	2.40	2.30	2.30	2.10	1.80	1.79	1.55	1.40	1.45	1.75	1.85	1.85	2.35	2.40
April	2.76	1.98	3.30	2.75	2.40	2.30	2.30	2.10	1.90	1.70	1.55	1.40	1.45	1.81	1.85	1.85	2.40	2.40
May	2.53	2.20	2.30	2.75	2.20	2.30	2.30	1.96	1.90	1.70	1.55	1.40	1.49	2.00	1.85	1.85	2.40	2.38
June	2.50	2.40	3.23	2.50	2.20	2.30	2.30	1.85	1.90	1.69	1.55	1.41	1.55	2.00	1.85	1.85	2.40	2.27
July	2.46	2.50	3.00	2.50	2.20	2.30	2.30	1.85	1.90	1.65	1.55	1.45	1.60	1.88	1.85	1.95	2.40	2.15
Aug.	2.23	2.60	3.00	2.35	2.20	2.30	2.30	1.85	1.90	1.65	1.55	1.45	1.64	1.85	1.85	1.95	2.40	2.15
Sept.	2.00	2.75	3.00	2.25	2.20	2.30	2.30	1.85	1.90	1.65	1.55	1.45	1.68	1.85	1.85	1.95	2.40	2.15
Oct.	2.00	2.90	3.00	2.25	2.23	2.30	2.19	1.85	1.90	1.60	1.54	1.45	1.75	1.85	1.85	1.95	2.40	2.03
Nov.	2.00	2.83	3.00	2.25	2.30	2.30	2.10	1.88	1.90	1.58	1.50	1.45	1.75	1.85	1.85	1.95	2.40	2.15
Dec.	2.00	2.75	2.88	2.25	2.30	2.30	2.03	1.80	1.90	1.55	1.49	1.45	1.75	1.85	1.85	2.11	2.40	2.15
Aver.	*2.49*	*2.38*	*3.04*	*2.57*	*2.27*	*2.30*	*2.26*	*1.93*	*1.88*	*1.68*	*1.54*	*1.43*	*1.58*	*1.85*	*1.85*	*1.91*	*2.35*	*2.25*

Cold-Rolled Strip Steel, at Pittsburgh, Cents a Pound

	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938
Jan.	6.00	6.25	3.50	4.50	5.00	4.00	3.90	2.95	3.00	2.85	2.65	2.25	1.92	1.88	2.40	2.60	2.60	2.85	3.20
Feb.	7.00	6.06	3.50	4.69	4.75	4.00	3.90	2.80	3.00	2.85	2.65	2.25	1.90	1.80	2.40	2.60	2.60	2.85	3.20
March	7.00	5.83	3.50	5.00	4.75	4.00	3.90	2.92	3.00	2.80	2.60	2.25	1.96	1.80	2.40	2.60	2.60	3.13	3.20
April	7.75	5.54	3.61	5.25	4.75	4.00	3.79	3.00	3.00	2.75	2.55	2.23	2.00	1.80	2.50	2.60	2.60	3.20	3.20
May	8.50	4.98	3.71	5.25	4.50	3.94	3.75	3.00	3.00	2.75	2.50	2.15	2.00	1.88	2.80	2.60	2.60	3.20	3.18
June	8.50	4.88	4.00	5.19	4.50	3.53	3.72	3.19	3.00	2.75	2.45	2.15	2.00	2.00	2.80	2.60	2.60	3.20	3.07
July	8.50	4.25	4.00	5.00	4.30	3.63	3.60	3.25	2.92	2.75	2.45	2.15	2.00	2.19	2.64	2.60	2.60	3.20	2.95
Aug.	8.50	3.96	4.10	5.00	4.13	3.75	3.60	3.25	2.90	2.75	2.35	2.15	2.00	2.25	2.60	2.60	2.60	3.20	2.95
Sept.	8.50	3.78	4.25	5.00	4.00	3.75	3.50	3.25	2.72	2.75	2.35	2.15	1.92	2.29	2.60	2.60	2.60	3.20	2.95
Oct.	8.25	3.75	4.50	5.00	4.00	3.75	3.25	3.00	2.75	2.75	2.35	2.13	1.90	2.40	2.60	2.60	2.60	3.20	2.83
Nov.	8.00	3.75	4.50	4.98	4.00	3.90	3.25	3.00	2.85	2.75	2.33	2.05	2.00	2.40	2.60	2.60	2.60	3.20	2.95
Dec.	6.63	3.75	4.50	4.91	4.00	3.90	3.00	3.00	2.85	2.75	2.25	2.03	2.00	2.40	2.60	2.60	2.80	3.20	2.95
Aver.	*7.76*	*4.73*	*3.97*	*4.98*	*4.39*	*3.85*	*3.60*	*3.05*	*2.92*	*2.77*	*2.46*	*2.16*	*1.97*	*2.09*	*2.58*	*2.60*	*2.62*	*3.14*	*3.06*

Hot-Rolled Sheets, No. 10 Gage, at Pittsburgh, Cents a Pound

	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938
Jan.	2.52	3.00	2.70	2.50	2.25	2.10	2.10	2.10	1.90	1.75	1.62	1.75	1.85	1.85	2.15	2.40
Feb.	2.64	3.00	2.70	2.50	2.20	2.10	2.10	2.10	1.90	1.75	1.60	1.75	1.85	1.85	2.15	2.40
March	2.95	2.93	2.69	2.50	2.20	2.10	2.10	2.10	1.90	1.71	1.55	1.75	1.85	1.85	2.35	2.40
April	3.25	2.86	2.53	2.43	2.18	2.08	2.10	2.06	1.85	1.70	1.55	1.81	1.85	1.85	2.40	2.40
May	3.20	2.80	2.40	2.40	2.22	2.00	2.13	2.00	1.85	1.70	1.44	2.00	1.85	1.85	2.40	2.38
June	3.00	2.76	2.31	2.32	2.25	2.00	2.20	2.00	1.85	1.70	1.50	2.00	1.85	1.87	2.40	2.27
July	3.00	2.68	2.30	2.30	2.25	2.00	2.14	2.00	1.85	1.70	1.65	1.88	1.85	1.95	2.40	2.15
Aug.	3.00	2.63	2.30	2.30	2.25	2.00	2.10	1.93	1.85	1.70	1.65	1.85	1.85	1.95	2.40	2.15
Sept.	3.00	2.69	2.25	2.30	2.25	2.00	2.10	1.90	1.85	1.70	1.68	1.85	1.85	1.95	2.40	2.15
Oct.	3.00	2.70	2.26	2.30	2.14	2.00	2.10	1.90	1.85	1.70	1.75	1.85	1.85	1.95	2.40	2.03
Nov.	3.00	2.70	2.40	2.30	2.10	2.00	2.10	1.90	1.85	1.70	1.75	1.85	1.85	1.95	2.40	2.15
Dec.	3.00	2.70	2.50	2.30	2.10	2.08	2.18	1.90	1.80	1.70	1.75	1.85	1.85	2.15	2.40	2.15
Aver.	*2.96*	*2.79*	*2.45*	*2.37*	*2.20*	*2.04*	*2.12*	*1.99*	*1.86*	*1.71*	*1.62*	*1.85*	*1.85*	*1.92*	*2.35*	*2.25*

Cold-Rolled Sheets at Pittsburgh, Cents a Pound

	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938
Jan.	4.70	5.35	4.75	4.50	4.18	4.00	4.10	3.90	3.30	2.90	2.35	2.75	2.95	2.95	3.25	3.55
Feb.	4.78	5.35	4.68	4.43	4.15	4.08	4.10	3.90	3.90	2.80	2.25	2.75	2.95	2.95	3.25	3.50
March	5.00	5.35	4.46	4.40	4.15	4.15	4.10	3.88	3.24	2.86	2.30	2.75	2.95	2.95	3.49	3.45
April	5.00	5.25	4.40	4.33	4.15	4.04	4.10	3.80	3.10	2.90	2.30	2.85	2.95	2.95	3.55	3.45
May	5.35	5.10	4.40	4.29	4.15	4.00	4.10	3.75	3.03	2.89	2.34	3.15	2.95	2.95	3.55	3.43
June	5.35	5.10	4.22	4.20	4.25	4.00	4.10	3.65	3.02	2.85	2.29	3.15	2.95	2.95	3.55	3.32
July	5.35	5.06	5.15	4.20	4.25	4.00	4.10	3.60	3.10	2.85	2.40	2.99	2.95	3.05	3.55	3.20
Aug.	5.35	4.75	4.25	4.20	4.25	4.00	4.08	3.60	3.10	2.81	2.47	2.95	2.95	3.05	3.55	3.20
Sept.	5.35	4.72	4.25	*4.25	4.25	4.00	4.00	3.50	3.10	2.75	2.75	2.95	2.95	3.05	3.55	3.20
Oct.	5.35	4.60	4.29	4.25	4.15	4.00	4.00	3.45	3.10	2.65	2.75	2.95	2.95	3.05	3.55	3.08
Nov.	5.35	4.60	4.40	4.25	4.12	4.00	4.00	3.38	3.10	2.63	2.75	2.95	2.95	3.05	3.55	3.20
Dec.	5.25	4.75	4.50	4.25	4.00	4.08	3.98	3.30	3.02	2.65	2.75	2.95	2.95	3.25	3.55	3.20
Aver.	*5.19*	*5.00*	*4.39*	*4.30*	*4.17*	*4.03*	*4.06*	*3.64*	*3.13*	*2.80*	*2.48*	*2.96*	*2.95*	*3.02*	*3.49*	*3.31*

*No. 22 gage prior to Sept. 1, 1926. No. 20 gage from then until May 18, 1938. Subsequently cold rolled sheet base adopted May 18.

Tin Plate at Pittsburgh, Dollars a Base Box

	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938
Jan.	$7.35	$7.00	$7.00	$4.75	$4.75	$5.50	$5.50	$5.50	$5.50	$5.25	$5.35	$5.25	$5.00	$4.75	$4.25	$5.25	$5.25	$5.25	$4.85	*$5.35
Feb.	7.35	7.00	7.00	4.71	4.80	5.50	5.50	5.50	5.50	5.25	5.35	5.25	5.00	4.75	4.25	5.25	5.25	5.25	4.85	*5.35
March	7.26	7.00	7.00	4.60	5.23	5.50	5.50	5.50	5.50	5.25	5.35	5.25	5.00	4.75	4.25	5.25	5.25	5.25	4.85	*5.35
April	7.00	7.00	6.44	4.75	6.00	5.50	5.50	5.50	5.50	5.25	5.35	5.25	5.00	4.75	4.25	5.25	5.25	5.25	5.35	*5.35
May	7.00	7.00	6.25	4.75	5.70	5.50	5.50	5.50	5.50	5.25	5.35	5.25	5.00	4.75	4.25	5.25	5.25	5.25	5.35	*5.35
June	7.00	7.00	6.25	4.75	5.50	5.50	5.50	5.50	5.50	5.25	5.35	5.25	5.00	4.75	4.25	5.25	5.25	5.25	5.35	*5.35
July	7.00	7.50	5.69	4.75	5.50	5.50	5.50	5.50	5.50	5.25	5.35	5.25	5.00	4.75	4.25	5.25	5.25	5.25	5.35	*5.35
Aug.	7.00	9.00	5.25	4.75	5.50	5.50	5.50	5.50	5.50	5.25	5.35	5.25	5.00	4.75	4.25	5.25	5.25	5.25	5.35	*5.35
Sept.	7.00	9.00	5.25	4.75	5.50	5.50	5.50	5.50	5.50	5.25	5.35	5.25	5.00	4.75	4.65	5.25	5.25	5.25	5.35	*5.35
Oct.	7.00	8.33	5.13	4.75	5.50	5.50	5.50	5.50	5.50	5.25	5.35	5.00	4.75	4.75	4.65	5.25	5.25	5.25	5.35	*5.35
Nov.	7.00	7.50	4.75	4.75	5.50	5.50	5.50	5.50	5.50	5.25	5.35	5.00	4.75	4.55	4.65	5.25	5.25	5.25	5.35	*5.18
Dec.	7.00	7.00	4.73	4.75	5.50	5.50	5.50	5.50	5.25	5.25	5.35	5.00	4.75	4.25	5.25	5.25	5.25	5.25	5.35	5.00
Aver.	*7.08*	*7.53*	*5.90*	*4.73*	*5.42*	*5.50*	*5.50*	*5.50*	*5.48*	*5.25*	*5.36*	*5.19*	*4.94*	*4.69*	*4.43*	*5.25*	*5.25*	*5.25*	*5.22*	*5.31*

*Published price during these months was $5.35 a base box, but in a post-season action producers granted a retroactive price adjustment on all shipments between Jan. 1 and Nov. 10. *See* THE IRON AGE, *Dec. 1, 1938, page 94.*

Wire Nails at Pittsburgh, Keg of 100 Lb.

	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938
Jan.	$3 50	$4 50	$3 25	$2 50	$2 70	$3 00	$2 85	$2 65	$2 64	$2 54	$2 65	$2 33	$1 90	$1 95	$1 86	$2 35	$2 60	$2 40	$2 25	$2 75
Feb.	3 50	4 50	3 21	2 40	2 78	3 00	2 85	2 65	2 56	2 63	2 65	2 25	1 90	1.95	1 83	2 35	2 60	2 25	2 31	2 75
March	3 44	4 00	3 02	2 40	2 83	3 00	2 85	2 65	2 55	2 65	2 65	2 25	1 90	1 95	1 85	2 35	2 60	2 10	2 70	2 75
April	3 25	4 00	3 13	2 40	2 93	3 00	2 80	2 65	2 55	2 65	2 65	2 16	1 90	1 95	1 85	2 41	2 60	2 10	2 75	2 75
May	3 25	4 00	3 05	2 40	3 00	2 93	2 75	2 65	2 50	2 55	2 65	2 15	1 85	1 95	1 85	2 60	2 60	2 10	2 75	2 75
June	3 25	4 00	3 00	2 40	3 00	2 90	2 68	2 65	2 50	2 55	2 65	2.13	1 80	1 95	1 85	2 60	2 60	2 10	2 75	2 69
July	3 25	4 00	2 81	2 40	3 00	2 88	2 65	2 65	2 53	2 55	2 64	2 05	1 80	1 95	2.04	2 60	2 60	2 10	2 75	2 45
Aug.	3 25	4 25	2 75	2 48	3.00	2 81	2 65	2 65	2 55	2 55	2 55	2 04	1 88	1 95	2 10	2 60	2 55	2 10	2 75	2 45
Sept.	3 25	4 25	2 86	2 63	3 00	2.78	2 65	2 65	2 55	2 55	2 50	2 00	1 90	1 95	2 10	2 60	2 40	1 97	2 75	2 45
Oct.	3 31	4 25	2 90	2 70	3 00	2 75	2 63	2 65	2 54	2 55	2 43	1 99	1 90	1 95	2 10	2 60	2 40	2 05	2 75	2 45
Nov.	3 50	4 05	2 84	2 70	3 00	2.75	2 65	2.65	2 50	2 55	2 40	1 93	1 90	1 95	2 10	2 60	2 40	2 05	2 75	2.45
Dec.	4 12	3 25	2 69	2 70	3.00	2 85	2 65	2 65	2 50	2 63	2 40	1 90	1 93	1 95	2 35	2 60	2 40	2 25	2 75	2.45
Aver.	*3 41*	*4 09*	*2 96*	*2 51*	*2 94*	*2 89*	*2 72*	*2 65*	*2 54*	*2 58*	*2 57*	*2.10*	*1 88*	*1 95*	*1 99*	*2 52*	*2 53*	*2 13*	*2 67*	*2 60*

Plain Wire, Base, at Pittsburgh, Cents a Pound

	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938
Jan.	3 25	3 25	3 25	2 25	2 45	2 75	2 60	2 50	2 49	2 40	2 50	2 40	2 20	2 20	2 16	2 20	2 30	2 30	2 60	2 90
Feb.	3 25	3 50	3 13	2 20	2 63	2 75	2 60	2 50	2 41	2 48	2 50	2 40	2 20	2 20	2 10	2 20	2 30	2 30	2 60	2 90
March	3 19	3 50	3 00	2 25	2 65	2 75	2 60	2 50	2 40	2 50	2 50	2 40	2 20	2 20	2 10	2 20	2 30	2 30	2 84	2 90
April	3 00	3 50	3 00	2 25	2 68	2 75	2 50	2 50	2 40	2 50	2 50	2 38	2 20	2 20	2 10	2 23	2 30	2 40	2 90	2 90
May	3 00	3 50	3 00	2 25	2 75	2 68	2 50	2 50	2 40	2 50	2 50	2 30	2 20	2 20	2 10	2 30	2 30	2 40	2 90	2 90
June	3 00	3 50	2 75	2 25	2.75	2 65	2 49	2 50	2 40	2 50	2 50	2 30	2 20	2 20	2.10	2 30	2 30	2 40	2 90	2 84
July	3 00	3 50	2 56	2 25	2 75	2 63	2 50	2 50	2 40	2 42	2 50	2 30	2 20	2 20	2 10	2 30	2 30	2 40	2 90	2 60
Aug.	3 00	3 69	2 50	2 29	2 75	2 56	2 50	2 50	2 40	2 40	2 43	2 30	2 20	2 20	2 10	2 30	2 30	2 40	2 90	2 60
Sept.	3.00	3 75	2 58	2 39	2 75	2 53	2 50	2 50	2 40	2 40	2 40	2 30	2.20	2 20	2 10	2 30	2 30	2 40	2 90	2 60
Oct.	3 17	3 75	2 60	2 45	2 75	2 50	2 50	2 50	2 40	2 40	2 40	2 30	2.20	2 20	2.10	2 30	2 30	2 50	2 90	2 60
Nov.	3 29	3 65	2 56	2 45	2 75	2 50	2 50	2 50	2 40	2 40	2 40	2 30	2 20	2 20	2 10	2 30	2 30	2 50	2 90	2 60
Dec.	3 21	3 25	2 44	2 45	2.75	2 60	2 50	2.50	2 40	2 48	2 40	2 22	2 20	2 20	2 20	2 30	2 30	2 60	2 90	2.60
Aver.	*3 11*	*3 53*	*2 78*	*2 31*	*2 70*	*2 64*	*2 52*	*2 50*	*2 41*	*2 45*	*2 46*	*2.33*	*2 20*	*2 20*	*2 11*	*2 27*	*2 30*	*2 41*	*2 84*	*2 74*

Black Plate at Pittsburgh, Cents a Pound

(28 gage up to July 1, 1938; 29 and lighter since)

	1930	1931	1932	1933	1934	1935	1936	1937	1938
Jan.	2 95	2 65	2 54	2 29	2 65	2 75	2 75	2 95	3 30
Feb.	2 95	2 63	2 50	2 28	2 65	2 75	2 75	2 95	3 30
March	2 89	2 60	2 45	2 30	2 65	2 75	2 75	3 21	3 30
April	2 85	2·60	2 45	2 30	2 70	2 75	2 75	3 30	3 30
May	2 84	2 60	2 43	2 30	2 85	2 75	2 75	3 30	3 30
June	2 82	2 60	2 40	2 30	2 85	2 75	2 75	3 30	3 30
July	2 78	2 60	2 40	2 93	2 78	2 75	2 75	3 30	3 26
Aug.	2 75	2 58	2 39	2 50	2 75	2 75	2 75	3 30	3 15
Sept.	2 75	2 65	2 35	2 50	2 75	2 75	2 75	3 30	3 15
Oct.	2 75	2 65	2 35	2 50	2 75	2 75	2 75	3 30	3 15
Nov.	2 67	2 65	2 30	2 50	2 75	2 75	2 75	3 30	3 15
Dec.	2 67	2 65	2 30	2 65	2 75	2 75	2 95	3 30	3.05
Aver.	*2 81*	*2 62*	*2 41*	*2 45*	*2 74*	*2 75*	*2 76*	*3 23*	*3 25*

Soft Steel Bars at Chicago, Cents a Pound

	1930	1931	1932	1933	1934	1935	1936	1937	1938
Jan.	1 99	1 71	1 68	1 70	1 80	1 85	1 90	2 25	2 50
Feb.	1 95	1 72	1 65	1 70	1 80	1 85	1 90	2 25	2 50
March	1 95	1 70	1 68	1 70	1 80	1 85	1 90	2 45	2 50
April	1 91	1.75	1 70	1 70	1 84	1.85	1 90	2 50	2 50
May	1 85	1 70	1 70	1 70	1 95	1 85	1 90	2 50	2 50
June	1 83	1 70	1 70	1 70	1 95	1 85	1 90	2 50	2 45
July	1 75	1 70	1 70	1 70	1 87	1 85	2 00	2 50	2 25
Aug.	1 75	1 70	1 70	1 69	1 85	1 85	2 00	2 50	2.25
Sept.	1 71	1 70	1 70	1 65	1 85	1 85	2 00	2 50	2 25
Oct.	1 70	1 70	1 70	1 80	1 85	1 90	2 10	2 50	2 25
Nov.	1 70	1 70	1 70	1 80	1 85	1 90	2 10	2 50	2.25
Dec.	1 70	1 60	1 70	1 80	1 85	1 90	2 10	2 50	2 25
Aver.	*1 82*	*1 70*	*1 69*	*1 72*	*1 86*	*1 86*	*1 97*	*2 45*	*2 37*

Structural Shapes at Chicago, Cents a Pound

	1930	1931	1932	1933	1934	1935	1936	1937	1938
Jan.	1 99	1 71	1 68	1 70	1 75	1 85	1 85	2 10	2 30
Feb.	1 95	1 72	1 65	1 70	1 75	1 85	1 85	2 10	2 30
March	1 94	1 70	1 68	1 70	1 75	1 85	1 85	2 25	2 30
April	1 90	1 75	1 70	1 70	1 75	1 85	1 85	2 30	2 30
May	1 83	1 70	1 70	1 70	1 90	1 85	1 85	2 30	2 30
June	1 79	1 70	1 70	1 70	1 90	1 85	1 85	2 30	2 26
July	1 75	1 70	1 70	1 70	1 86	1 85	1 95	2 30	2 10
Aug.	1 75	1 70	1 70	1 69	1 85	1 85	1 95	2 30	2 10
Sept.	1 71	1.70	1 70	1 65	1 85	1 85	1 95	2 30	2 10
Oct.	1 70	1 70	1 70	1 75	1 85	1 85	1 95	2 30	2 10
Nov.	1 70	1 70	1 70	1 75	1 85	1 85	1 95	2 30	2.10
Dec.	1 70	1 60	1 70	1 75	1 85	1 85	1 95	2 30	2.10
Aver.	*1 81*	*1 70*	*1 69*	*1 71*	*1 83*	*1 85*	*1 90*	*2 26*	*2 20*

Rail Steel Bars at Chicago, Cents a Pound

	1930	1931	1932	1933	1934	1935	1936	1937	1938
Jan.	1 88	1 60	1 50	1 50	1 70	1 75	1.75	2 10	2 35
Feb.	1 80	1 60	1 50	1 50	1 70	1 75	1 75	2 10	2.35
March	1 85	1 60	1 50	1 50	1 70	1 75	1 75	2 30	2 35
April	1 81	1 60	1 50	1 50	1 74	1 75	1.75	2 35	2 35
May	1 80	1 60	1 50	1 50	1 85	1 75	1 75	2 35	2.35
June	1.75	1 60	1 50	1 50	1 86	1 75	1.75	2 35	2 30
July	1 75	1 60	1 50	1 50	1 79	1 75	1 85	2 35	2 10
Aug.	1 65	1 60	1 50	1 51	1 75	1 75	1 85	2 35	2 10
Sept.	1 65	1 60	1 50	1 55	1 75	1 75	1 85	2 35	2.10
Oct.	1 65	1 54	1 50	1 70	1 75	1.75	1.95	2 35	2 10
Nov.	1 64	1 50	1 50	1 70	1.75	1 75	1 95	2 35	2.10
Dec.	1 60	1 50	1 50	1 70	1 75	1 75	1 95	2 35	2.10
Aver.	*1 74*	*1 58*	*1 50*	*1 56*	*1 76*	*1.75*	*1 88*	*2 30*	*2 22*

Common Bar Iron at Chicago, Cents a Pound

	1930	1931	1932	1933	1934	1935	1936	1937	1938
Jan.	1 98	1 71	1 68	1 60	1 60	1 80	1 80	2 15	2 40
Feb.	1 95	1 73	1 70	1 60	1 60	1 80	1 80	2 15	2 40
March	1 95	1 70	1 70	1 60	1 60	1 80	1 80	2 35	2 40
April	1 92	1 74	1 70	1 60	1 60	1 80	1 80	2 40	2 40
May	1 90	1 70	1 66	1 60	1 69	1 80	1 80	2 40	2 40
June	1 90	1 70	1 65	1 60	1 85	1 80	1 80	2 40	2 40
July	1 90	1 70	1 65	1 60	1 84	1 80	1 80	2 40	2 15
Aug.	1 75	1 70	1 62	1 60	1 80	1 80	1 80	2 40	2 15
Sept.	1 74	1 70	1 60	1 60	1 80	1 80	1 80	2 40	2 15
Oct.	1 70	1 70	1 60	1 60	1 80	1 80	1 80	2 40	2 15
Nov.	1 70	1 70	1 60	1 60	1 80	1 80	1 80	2 40	2 15
Dec.	1.70	1 60	1 60	1 60	1 80	1 80	1 80	2 40	2.15
Aver.	*1 84*	*1 70*	*1 65*	*1 60*	*1 76*	*1 80*	*1 80*	*2 35*	*2.27*

Galvanized Sheets at Chicago, Cents a Pound

	1930	1931	1932	1933	1934	1935	1936	1937	1938
Jan.	3 60	3 00	2 90	2 76	2 95	3 20	3.20	3 50	3 90
Feb.	3 40	3 00	2 87	2 55	2 95	3 20	3 20	3 50	3 90
March	3 40	3 00	2 93	2 70	2 95	3 20	3 20	3 82	3 90
April	3 40	2 90	2 95	2 73	3 05	3 20	3 20	3 90	3 90
May	3 33	2 90	2 95	2 86	3 35	3 20	3 20	3 90	3.90
June	3 29	2 87	2 95	2 95	3 35	3 20	3 20	3.90	3.76
July	3 25	3 00	2 95	2 95	3 23	3 20	3 30	3 90	3.50
Aug.	3 18	3 00	2 91	2 95	3 20	3 20	3 30	3 90	3 50
Sept.	3 10	3 00	2 85	2 95	3 20	3 20	3 30	3 90	3.50
Oct.	3 10	3 00	2 95	2 95	3 20	3 20	3 30	3 90	3 45
Nov.	3 10	3 00	2 95	2 95	3 20	3 20	3 30	3 90	3.50
Dec.	3 04	2 96	2 95	2 95	3 20	3 20	3 50	3 90	3.50
Aver.	*3 27*	*2 97*	*2 93*	*2 85*	*3 15*	*3 20*	*3 27*	*3 85*	*3 68*

Pipe

Cast Iron Pipe at New York, Net Ton

6-in. and Larger

	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938
Jan.	$47.30	$54.90	$61.60	$54.60	$50.60	$48.60	$37.25	$39.60	$36.10	$37.90	$30.20	$35.30	$43.00	$45.00	$45.20	$48.00	$53.00
Feb.	47.30	56.50	61.60	54.60	50.60	48.60	37.25	39.35	38.60	37.90	29.70	35.30	43.00	45.00	45.20	48.00	53.00
March	47.68	57.75	61.60	53.00	50.60	47.20	37.25	38.60	38.75	37.90	28.40	35.30	43.00	45.00	45.20	51.00	53.00
April	48.80	58.50	61.60	52.60	50.60	47.35	36.25	37.40	39.50	35.40	28.20	35.30	43.00	45.00	45.20	53.00	53.00
May	49.60	58.50	61.60	50.85	50.60	45.80	37.60	35.85	39.90	34.15	28.20	35.30	43.00	45.00	45.20	53.00	53.00
June	50.80	61.35	61.60	50.60	50.60	44.42	37.60	35.10	39.90	33.70	28.20	38.30	44.00	45.15	45.20	53.00	52.20
July	53.50	62.30	60.60	50.60	50.60	42.75	37.60	33.20	39.30	32.90	28.73	38.30	45.00	45.20	45.90	53.00	49.00
Aug.	54.10	62.62	59.60	50.60	50.60	39.65	36.60	33.60	38.90	32.90	31.10	38.30	45.00	45.20	45.90	53.00	49.00
Sept.	54.50	63.60	56.60	50.60	49.85	37.25	35.60	33.60	38.90	32.90	31.30	38.30	45.00	45.20	45.90	53.00	49.00
Oct.	54.50	63.60	56.35	50.60	49.60	36.50	35.60	34.60	38.90	32.90	33.30	38.00	45.00	45.20	45.90	53.00	49.00
Nov.	54.50	63.60	55.60	50.60	49.60	36.25	37.32	34.60	38.65	32.90	33.30	43.00	45.00	45.20	45.90	53.00	49.00
Dec.	54.75	63.60	55.20	50.60	49.10	37.00	39.40	34.60	37.90	32.50	34.30	43.00	45.00	45.20	47.90	53.00	49.00
Aver.	*51.44*	*60.57*	*59.46*	*51.65*	*50.25*	*42.61*	*37.11*	*35.84*	*38.78*	*34.50*	*30.41*	*37.81*	*44.08*	*45.11*	*45.71*	*52.00*	*50.93*

Cast Iron Pipe at Chicago, Net Ton

6-in. and Larger

	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938
Jan.	$42.50	$51.80	$56.20	$48.70	$49.20	$44.32	$35.00	$43.33	$42.20	$43.00	$40.40	$40.00	$44.00	$47.00	$48.40	$50.00	$55.00
Feb.	41.60	53.20	56.20	49.95	49.20	43.70	35.83	44.45	44.95	44.00	40.40	40.90	44.00	47.00	48.10	50.00	55.00
March	42.10	54.20	56.20	47.60	49.20	44.20	35.70	44.70	45.20	43.20	38.00	41.40	44.00	47.00	48.00	53.00	55.00
April	42.85	57.20	56.20	46.70	49.20	43.95	36.20	44.20	45.20	43.00	36.40	41.40	44.00	47.36	48.40	55.00	55.00
May	44.60	60.20	55.20	47.07	49.20	43.20	37.80	44.20	45.15	43.00	36.40	41.40	44.00	48.40	48.40	55.00	55.00
June	45.47	60.20	54.70	48.20	48.90	42.70	40.20	45.20	45.00	42.20	36.40	42.90	45.50	48.40	48.40	55.00	54.20
July	46.10	60.20	54.80	47.70	47.95	41.58	40.80	45.20	45.00	42.00	34.40	43.40	47.00	48.40	48.40	55.00	51.00
Aug.	46.40	60.20	53.45	49.20	48.30	37.40	42.20	45.20	44.75	42.00	35.20	43.40	47.00	48.40	48.40	55.00	51.00
Sept.	47.45	59.95	51.80	49.20	47.58	34.58	42.20	45.20	43.60	42.00	38.40	43.40	47.00	48.40	48.40	55.00	51.00
Oct.	51.20	57.40	49.70	49.20	47.20	34.20	43.00	43.70	44.00	41.60	38.40	43.00	47.00	48.40	48.40	55.00	51.00
Nov.	51.20	55.45	48.20	50.20	46.70	34.50	45.20	43.70	44.00	40.50	38.40	43.20	47.00	48.40	48.40	55.00	51.00
Dec.	51.20	55.20	47.60	50.20	46.70	35.08	43.10	43.70	43.60	40.20	38.40	44.00	47.00	48.40	50.00	55.00	51.00
Aver.	*46.06*	*57.10*	*53.35*	*48.66*	*48.32*	*39.95*	*39.77*	*44.39*	*44.39*	*42.23*	*37.60*	*42.37*	*45.63*	*47.30*	*48.47*	*54.00*	*52.93*

Standard Steel Pipe at Pittsburgh, Net Ton

Computed from list discounts, for carload lots; price for base size pipe, 1 *to* 3 *in.;* ¾ *to* 3 *in. prior to April* 13, 1931

	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938
Jan.	$51.87	$61.13	$70.30	$70.30	$70.30	$70.30	$68.60	$70.30	$70.30	$66.50	$64.84	$65.00	$61.75	$68.40	$68.40	$61.00	$71.00
Feb.	51.87	66.50	70.30	70.30	70.30	70.30	68.60	70.30	70.30	66.50	64.84	65.00	61.75	68.40	64.98	61.00	71.00
March	51.87	66.50	70.30	70.30	70.30	70.30	68.60	70.30	70.30	66.50	64.84	65.00	61.75	68.40	61.80	69.00	71.00
April	51.87	68.02	70.30	70.30	70.30	70.30	69.88	70.30	66.50	66.50	64.84	58.00	63.41	68.40	61.00	71.00	71.00
May	51.87	70.30	70.30	70.30	70.30	70.30	70.30	70.30	66.50	63.59	64.84	58.00	68.40	68.40	61.00	71.00	71.00
June	51.87	70.30	70.30	70.30	70.30	70.30	70.30	70.30	66.50	64.84	64.84	58.00	68.40	68.40	61.00	71.00	71.00
July	51.87	70.30	70.30	70.30	70.30	70.30	70.30	70.30	66.50	64.84	64.84	61.75	68.40	68.40	61.00	71.00	63.00
Aug.	54.74	70.30	70.30	70.30	70.30	70.30	70.30	70.30	66.50	64.84	64.84	61.75	68.40	68.40	61.00	71.00	63.00
Sept.	57.43	70.30	70.30	70.30	70.30	70.30	70.30	70.30	66.50	64.84	65.00	61.75	68.40	68.40	61.00	71.00	63.00
Oct.	58.74	70.30	70.30	70.30	70.30	68.54	70.30	70.30	66.50	64.84	65.00	61.75	68.40	68.40	61.00	71.00	63.00
Nov.	61.13	70.30	70.30	70.30	70.30	66.79	70.30	70.30	66.50	64.84	65.00	61.75	68.40	68.40	61.00	71.00	63.00
Dec.	61.13	70.30	70.30	70.30	70.30	66.79	70.30	70.30	66.50	64.84	65.00	61.75	68.40	68.40	61.00	71.00	63.00
Aver.	*54.69*	*68.71*	*70.30*	*70.30*	*70.30*	*69.57*	*69.84*	*70.30*	*67.45*	*65.29*	*64.89*	*61.63*	*66.32*	*68.40*	*62.01*	*69.17.*	*67.00*

Wrought Iron Pipe at Pittsburgh, Net Ton

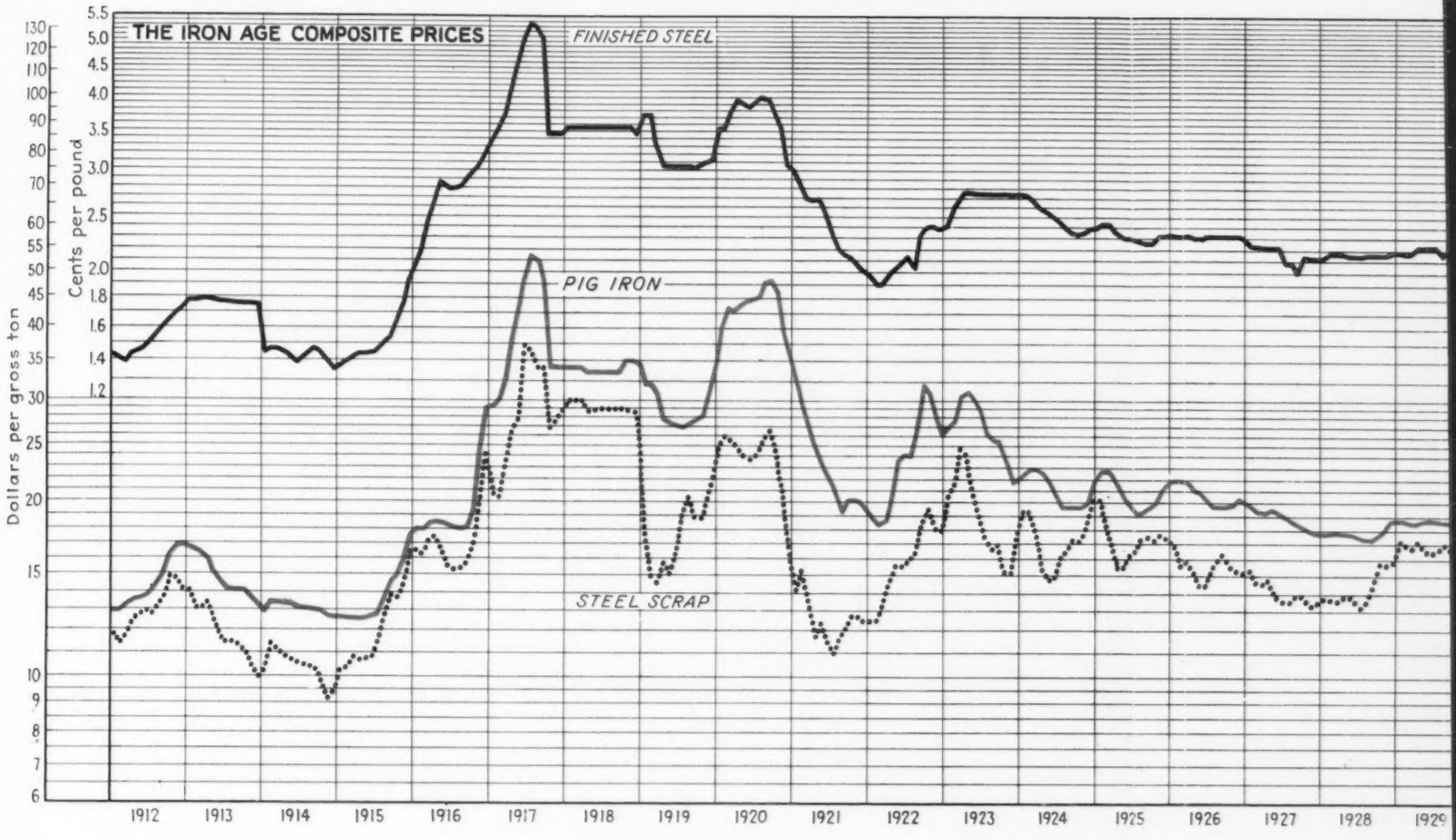
Computed from list discounts, for carload lots; price for base size pipe, 1½ *in.;* 1½ *and* 2 *in. prior to Oct.* 1, 1932.

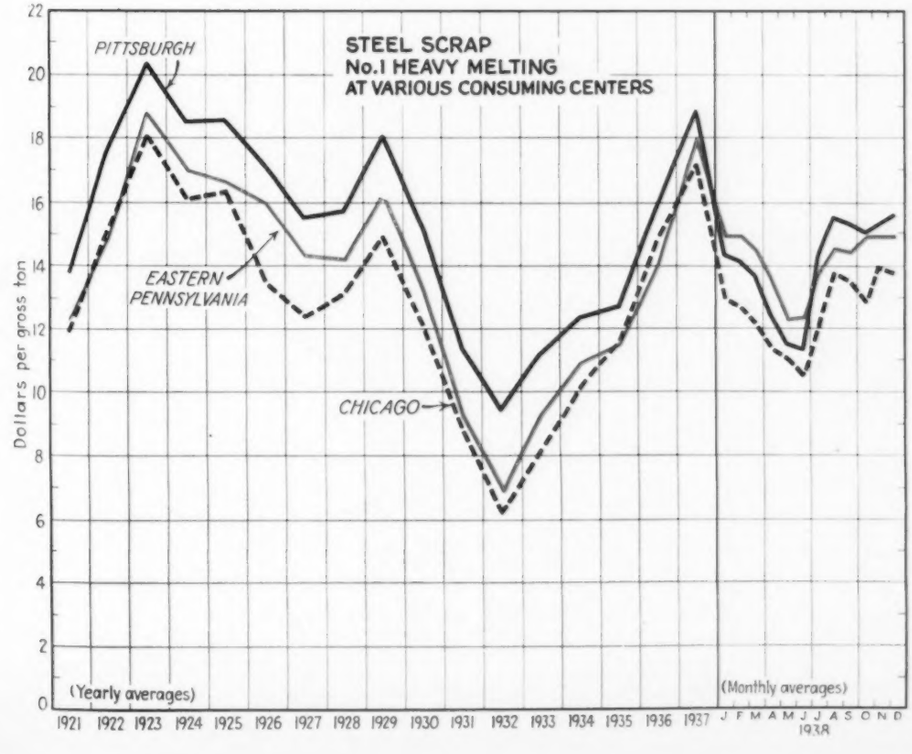
	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938
Jan.	$100.96	$122.56	$131.10	$131.10	$127.82	$127.82	$127.82	$118.56	$118.56	$118.56	$118.56	$120.00	$113.00	$113.00	$113.00	$119.75	$132.00
Feb.	100.96	127.82	131.10	131.10	127.82	127.82	127.82	118.56	118.56	118.56	116.71	120.00	113.00	113.00	113.00	122.00	132.00
March	100.96	127.82	131.10	127.82	127.82	127.82	127.82	118.56	118.56	118.56	114.85	120.00	113.00	113.00	113.00	122.00	132.00
April	100.96	129.02	131.10	127.82	127.82	127.82	127.82	118.56	118.56	118.56	114.85	114.75	113.00	113.00	113.00	122.00	132.00
May	100.96	131.10	131.10	127.82	127.82	127.82	127.82	118.56	118.56	118.56	114.85	113.00	113.00	113.00	113.00	127.00	132.00
June	100.96	131.10	131.10	127.82	127.82	127.82	127.82	118.56	118.56	118.56	114.85	113.00	113.00	113.00	113.00	132.00	132.00
July	100.96	131.10	131.10	127.82	127.82	127.82	127.82	118.56	118.56	118.56	114.85	113.00	113.00	113.00	113.00	132.00	124.00
Aug.	105.74	131.10	131.10	127.82	127.82	127.82	127.82	118.56	118.56	118.56	114.85	113.00	113.00	113.00	113.00	132.00	124.00
Sept.	116.33	131.10	131.10	127.82	127.82	127.82	127.82	118.56	118.56	118.56	116.14	113.00	113.00	113.00	113.00	132.00	124.00
Oct.	120.41	131.10	131.10	127.82	127.82	127.82	127.82	118.56	118.56	118.56	120.00	113.00	113.00	113.00	113.00	132.00	124.00
Nov.	120.41	131.10	131.10	127.82	127.82	127.82	127.82	118.56	118.56	118.56	120.00	113.00	113.00	113.00	113.00	132.00	124.00
Dec.	120.41	131.10	131.10	127.82	127.82	127.82	127.82	118.56	118.56	118.56	120.00	113.00	113.00	113.00	113.00	132.00	124.00
Aver.	*107.50*	*129.67*	*131.10*	*128.37*	*127.82*	*127.82*	*127.82*	*118.56*	*118.56*	*118.56*	*116.71*	*114.90*	*113.00*	*113.00*	*113.00*	*128.06*	*128.00*

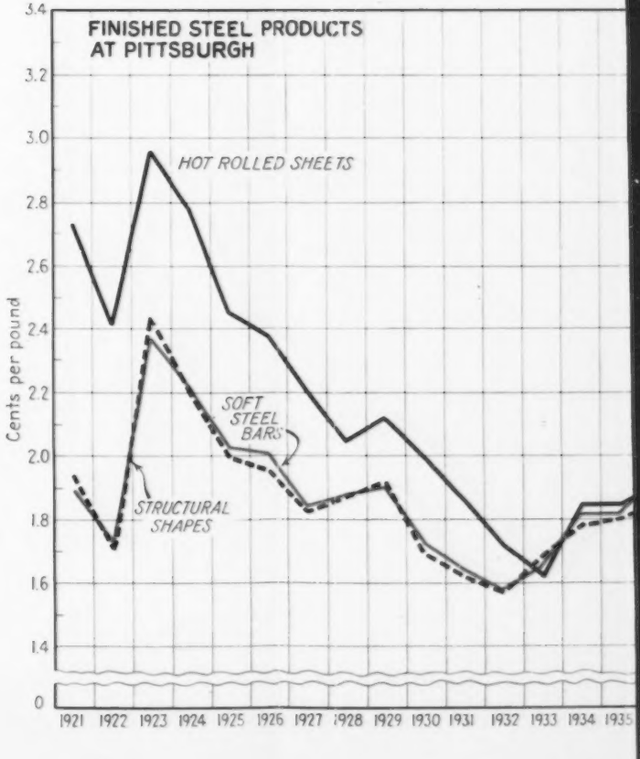
Lake Superior Iron Ore

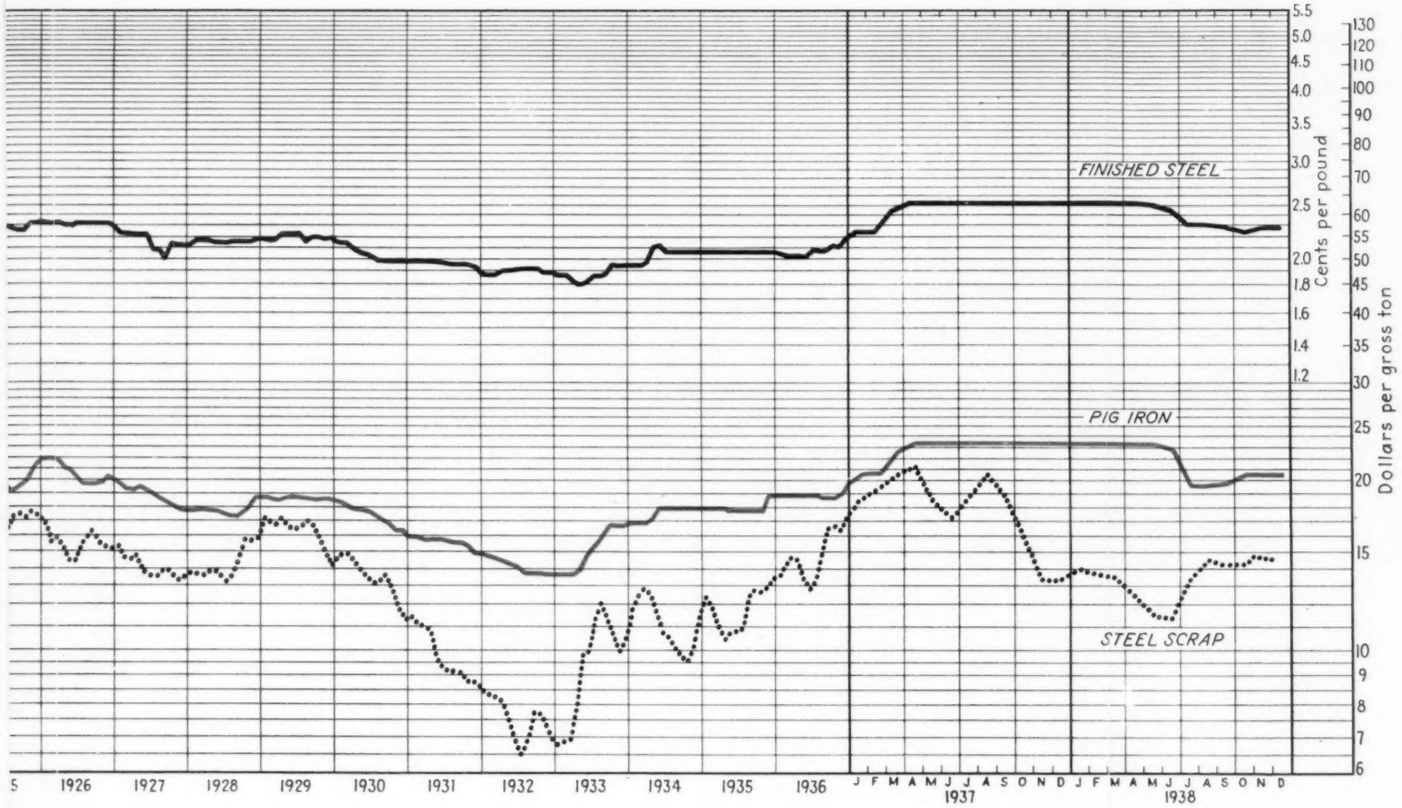
Non-Bessemer Mesaba, 51.50 *Per Cent, at Lake Erie Ports, Gross Ton*

	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938
Jan.	$5.05	$5.55	$6.55	$5.55	$5.05	$5.55	$4.75	$4.25	$4.25	$4.25	$4.25	$4.50	$4.50	$4.50	$4.50	$4.50	$4.50	$4.50	$4.50	$4.50	$4.95
Feb.	5.05	5.55	6.55	5.55	5.05	5.55	4.75	4.25	4.25	4.25	4.25	4.50	4.50	4.50	4.50	4.50	4.50	4.50	4.50	4.50	4.95
March	5.05	5.55	6.55	5.55	5.05	5.55	4.75	4.25	4.25	4.25	4.25	4.50	4.50	4.50	4.50	4.50	4.50	4.50	4.50	4.95	4.95
April	5.05	5.55	6.55	5.55	5.05	5.55	4.75	4.25	4.25	4.25	4.25	4.50	4.50	4.50	4.50	4.50	4.50	4.50	4.50	4.95	4.95
May	5.05	5.55	6.55	5.55	5.05	5.55	4.75	4.25	4.25	4.25	4.25	4.50	4.50	4.50	4.50	4.50	4.50	4.50	4.50	4.95	4.95
June	5.05	5.55	6.55	5.55	5.05	5.55	4.75	4.25	4.25	4.25	4.25	4.50	4.50	4.50	4.50	4.50	4.50	4.50	4.50	4.95	4.95
July	5.50	5.55	6.55	5.55	5.05	5.55	4.75	4.25	4.25	4.25	4.25	4.50	4.50	4.50	4.50	4.50	4.50	4.50	4.50	4.95	4.95
Aug.	5.50	5.55	6.55	5.55	5.05	5.55	4.75	4.25	4.25	4.25	4.25	4.50	4.50	4.50	4.50	4.50	4.50	4.50	4.50	4.95	4.95
Sept.	5.50	5.55	6.55	5.55	5.05	5.55	4.75	4.25	4.25	4.25	4.25	4.50	4.50	4.50	4.50	4.50	4.50	4.50	4.50	4.95	4.95
Oct.	5.75	5.55	6.55	5.55	5.05	5.55	4.75	4.25	4.25	4.25	4.25	4.50	4.50	4.50	4.50	4.50	4.50	4.50	4.50	4.95	4.95
Nov.	5.75	5.55	6.55	5.55	5.05	5.55	4.75	4.25	4.25	4.25	4.25	4.50	4.50	4.50	4.50	4.50	4.50	4.50	4.50	4.95	4.95
Dec.	5.75	5.55	6.55	5.55	5.05	5.55	4.75	4.25	4.25	4.25	4.25	4.50	4.50	4.50	4.50	4.50	4.50	4.50	4.50	4.95	4.95


THE IRON AGE COMPOSITE PRICES
FINISHED STEEL
PIG IRON
STEEL SCRAP
Dollars per gross ton
Cents per pound
1912 1913 1914 1915 1916 1917 1918 1919 1920 1921 1922 1923 1924 1925 1926 1927 1928 1929


STEEL SCRAP
No.1 HEAVY MELTING
AT VARIOUS CONSUMING CENTERS
PITTSBURGH
EASTERN PENNSYLVANIA
CHICAGO
Dollars per gross ton
(Yearly averages)
(Monthly averages)
1921 1922 1923 1924 1925 1926 1927 1928 1929 1930 1931 1932 1933 1934 1935 1936 1937 J F M A M J J A S O N D 1938

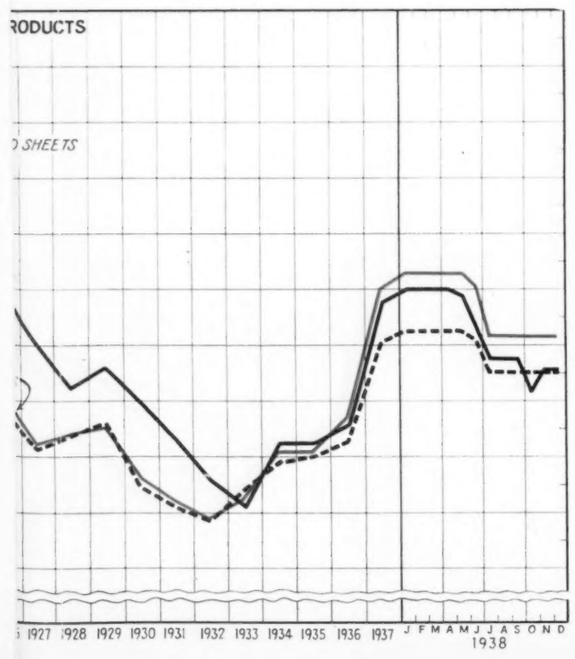

FINISHED STEEL PRODUCTS
AT PITTSBURGH
HOT ROLLED SHEETS
SOFT STEEL BARS
STRUCTURAL SHAPES
Cents per pound
1921 1922 1923 1924 1925 1926 1927 1928 1929 1930 1931 1932 1933 1934 1935

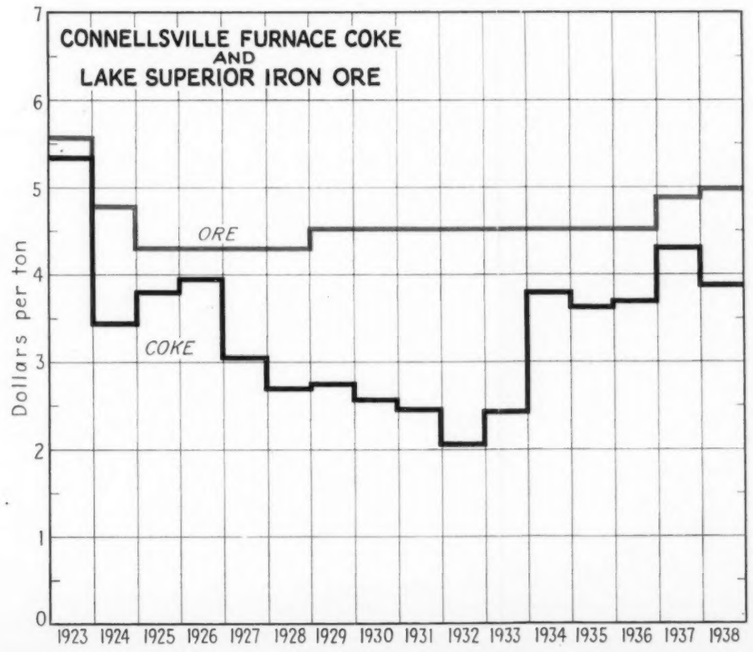


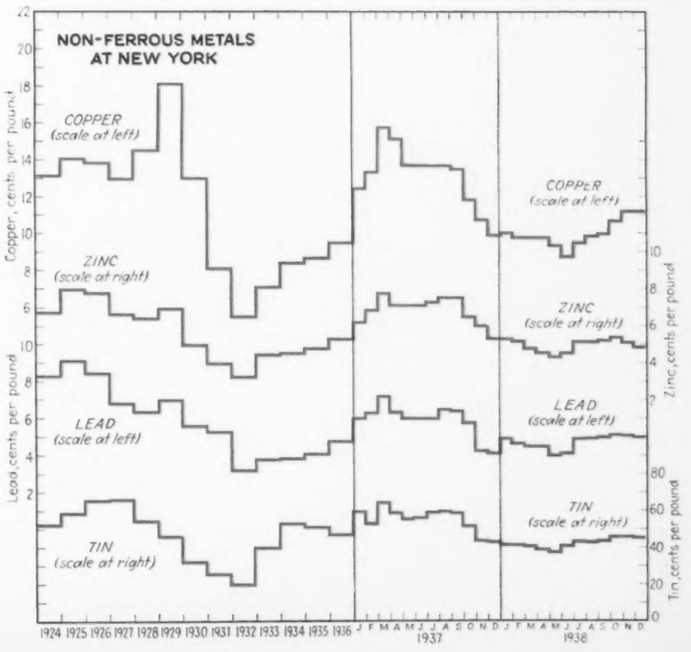
PRICE TRENDS

WHEN the price history of an industry is presented as columns of numerals, the true significance of this history is too frequently lost. In an effort to portray adequately the startling changes which steel prices have undergone in the past few years, THE IRON AGE has translated the price history of several important finished steel products, and the raw materials which go into their making, into graphs to bring out more forcibly the nature of these changes.

The data utilized in the construction of these graphs may be found in detail in the Statistical section herewith. The figures used are THE IRON AGE quotations.






NON-FERROUS METALS
AT NEW YORK
COPPER
(scale at left)
ZINC
(scale at right)
LEAD
(scale at left)
TIN
(scale at right)
Copper, cents per pound
Lead, cents per pound
Zinc, cents per pound
Tin, cents per pound
1924 1925 1926 1927 1928 1929 1930 1931 1932 1933 1934 1935 1936
J F M A M J J A S O N D J F M A M J J A S O N D
1937
1938

Monthly Average Prices of Non-Ferrous Metals from Daily Quotations in THE IRON AGE

Electrolytic Copper at New York, Cents a Pound

	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938
Jan.	13.55	14.52	12.46	14.73	13.84	12.99	13.85	16.59	17.75	9.79	7.12	4.75	7.92	8.75	9.00	12.41	10.18
Feb.	12.92	15.34	12.73	14.49	14.00	12.69	13.82	17.74	17.75	9.71	6.07	4.75	7.75	8.75	9.00	13.44	9.75
March	12.68	16.84	13.52	14.06	13.86	13.08	13.90	21.25	17.75	9.88	5.76	5.00	7.75	8.75	9.00	15.75	9.75
April	12.61	16.81	13.21	13.30	13.69	12.81	14.13	19.69	15.67	9.48	5.54	5.39	8.16	8.75	9.14	15.10	9.75
May	13.13	15.54	12.76	13.34	13.60	12.65	14.19	17.75	12.76	8.67	5.25	6.68	8.25	8.75	9.25	13.75	9.35
June	13.62	14.74	12.35	13.41	13.64	12.37	14.50	17.75	12.09	8.05	5.11	7.75	8.75	8.63	9.25	13.75	8.76
July	13.71	14.39	12.39	13.95	13.91	12.51	14.50	17.75	11.02	7.67	5.04	8.63	8.75	7.75	9.35	13.75	9.56
Aug.	13.74	13.87	13.26	14.48	14.19	13.00	14.50	17.75	10.65	7.26	5.15	8.75	8.75	7.92	9.50	13.75	9.87
Sept.	13.75	13.36	12.97	14.42	14.05	12.93	14.70	17.75	10.39	6.98	5.95	8.75	8.75	8.52	9.50	13.53	10.00
Oct.	13.66	12.58	12.96	14.29	13.88	12.98	15.16	17.75	9.60	6.75	5.72	7.97	8.75	8.94	9.54	11.81	10.74
Nov.	13.62	12.76	13.59	14.36	13.59	13.34	15.75	17.75	10.17	6.54	5.07	7.91	8.75	9.00	10.16	10.77	11.00
Dec.	14.00	12.88	14.23	13.82	13.31	13.79	15.84	17.75	10.29	6.60	4.78	7.87	8.75	9.00	10.73	9.98	*11.00
Aver.	*13.43*	*14.47*	*13.04*	*14.05*	*13.80*	*13.03*	*14.57*	*18.11*	*13.99*	*8.11*	*5.55*	*7.02*	*8.41*	*8.63*	*9.45*	*13.15*	*9.98

Zinc at New York, Cents a Pound

	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938
Jan.	7.38	9.62	5.83	5.06	7.28	6.78	8.10	8.75	7.03	6.00	6.70	5.59	4.37	3.38	3.38	4.62	4.08	5.22	6.20	5.35
Feb.	6.70	9.14	5.36	4.85	7.58	7.11	7.86	8.16	7.04	5.90	6.70	5.53	4.36	3.19	3.04	4.73	4.06	5.23	6.80	5.17
March	6.52	8.93	5.20	5.00	8.19	6.85	7.68	7.69	7.06	5.98	6.80	5.30	4.30	3.16	3.37	4.72	4.25	5.27	7.75	4.77
April	6.51	8.63	5.24	5.25	7.65	6.49	7.35	7.36	6.69	6.11	7.04	5.19	4.06	3.10	3.68	4.72	4.38	5.27	7.70	4.53
May	6.46	8.08	5.28	5.45	6.99	6.13	7.30	7.16	6.43	6.37	6.98	4.98	3.66	2.90	4.17	4.71	4.60	5.27	7.10	4.43
June	6.93	7.92	4.95	5.69	6.40	6.14	7.35	7.47	6.57	6.50	7.00	4.79	3.75	3.16	4.70	4.59	4.67	5.26	7.10	4.53
July	7.90	8.18	4.77	6.12	6.43	6.25	7.60	7.76	6.58	6.55	7.10	4.66	4.25	2.92	5.24	4.68	4.70	5.16	7.27	5.14
Aug.	7.84	8.31	4.69	6.59	6.68	6.53	7.55	7.69	6.70	6.59	7.15	4.72	4.17	3.13	5.28	4.63	4.92	5.17	7.56	5.14
Sept.	7.57	7.82	4.74	6.91	6.81	6.54	8.12	7.76	6.56	6.60	7.15	4.62	4.09	3.68	5.08	4.43	5.04	5.22	7.54	5.24
Oct.	7.83	7.51	5.10	7.20	6.66	6.67	8.65	7.66	6.35	6.60	7.09	4.40	3.73	3.41	5.12	4.19	5.21	5.22	6.45	5.40
Nov.	8.14	6.84	5.18	7.48	6.70	7.14	9.04	7.56	6.09	6.62	6.63	4.63	3.55	3.46	4.87	4.08	5.23	5.35	5.98	5.12
Dec.	8.59	6.00	5.25	7.46	6.60	7.73	8.97	7.39	6.15	6.70	6.09	4.43	3.50	3.50	4.82	4.06	5.22	5.64	5.36	*4.75
Aver.	*7.36*	*8.08*	*5.13*	*6.09*	*7.00*	*6.70*	*7.96*	*7.70*	*6.60*	*6.39*	*6.87*	*4.90*	*3.98*	*3.25*	*4.40*	*4.51*	*4.70*	*5.27*	*6.90*	*4.96

Lead at New York, Cents a Pound

	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938
Jan.	5.56	8.67	5.00	4.70	7.85	8.31	10.26	9.25	7.59	6.50	6.65	6.25	4.80	3.75	3.00	4.00	3.69	4.50	6.00	4.87
Feb.	5.05	8.88	4.54	4.70	8.14	9.01	9.38	9.08	7.40	6.34	6.85	6.24	4.55	3.72	3.00	4.00	3.53	4.51	6.23	4.63
March	5.23	9.21	4.08	4.71	8.47	9.23	8.90	8.46	7.57	6.00	7.41	5.66	4.53	3.15	3.15	4.00	3.58	4.60	7.19	4.50
April	5.03	8.95	4.33	5.13	8.19	8.19	8.01	7.91	7.10	6.10	7.19	5.58	4.42	3.00	3.27	4.18	3.69	4.60	6.32	4.50
May	5.05	8.55	4.99	5.51	7.39	7.27	8.08	7.75	6.60	6.13	7.00	5.51	3.82	3.00	3.65	4.14	3.96	4.60	6.00	4.40
June	5.34	8.48	4.56	5.73	7.14	7.08	8.35	8.08	6.42	6.30	7.00	5.41	3.92	2.99	4.17	3.98	4.02	4.60	6.00	4.15
July	5.65	8.67	4.40	5.75	6.28	7.15	8.33	8.60	6.33	6.22	6.80	5.25	4.40	2.73	4.46	3.77	4.12	4.60	6.00	4.88
Aug.	5.77	8.98	4.40	5.88	6.74	8.02	9.52	8.96	6.69	6.25	6.75	5.49	4.40	3.24	4.50	3.75	4.25	4.60	6.45	4.90
Sept.	6.12	8.11	4.60	6.20	7.06	8.09	9.60	8.80	6.30	6.45	6.88	5.50	4.40	3.47	4.50	3.68	4.41	4.60	6.40	5.00
Oct.	6.45	7.24	4.70	6.67	6.84	8.31	9.62	8.40	6.25	6.50	6.87	5.17	3.97	3.05	4.32	3.65	4.51	4.63	5.75	5.10
Nov.	6.76	6.33	4.70	7.20	6.87	8.96	9.84	8.00	6.27	6.39	6.29	5.10	3.94	3.04	4.29	3.57	4.50	5.11	5.03	5.09
Dec.	7.03	4.80	4.70	7.28	7.61	9.61	9.36	7.87	6.52	6.49	6.25	5.10	3.80	3.00	4.14	3.60	4.50	5.55	4.87	*4.79
Aver.	*5.76*	*8.07*	*4.58*	*5.79*	*7.39*	*8.27*	*9.10*	*8.39*	*6.75*	*6.31*	*6.83*	*5.52*	*5.25*	*3.18*	*3.87*	*3.86*	*4.06*	*4.71*	*6.02*	*4.73

Straits Tin at New York, Cents a Pound

	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938
Jan.	32.03	39.16	48.70	58.26	62.20	66.43	55.56	49.21	38.84	26.03	21.80	22.70	51.98	50.91	47.23	50.90	41.54
Feb.	30.74	41.98	53.41	57.09	63.65	69.05	52.47	49.39	38.63	26.27	21.97	23.51	51.78	49.99	47.94	52.10	41.23
March	29.14	48.61	55.03	53.67	64.47	69.23	52.11	48.85	36.76	27.02	21.81	24.35	53.84	46.88	48.00	62.74	41.16
April	30.58	45.84	50.02	52.27	63.35	67.88	52.28	45.93	35.90	25.13	19.17	27.16	55.66	50.05	46.97	59.02	38.41
May	30.92	43.11	44.08	54.65	62.36	67.47	51.53	43.88	32.16	23.16	20.90	35.94	53.57	51.10	46.31	55.64	36.83
June	31.46	40.97	42.74	55.93	60.63	67.42	47.92	44.20	30.26	23.53	19.58	44.23	51.31	51.08	42.24	55.88	40.36
July	31.67	38.47	46.29	58.05	62.98	64.01	47.01	46.29	29.76	24.96	20.89	46.28	51.94	52.31	42.96	59.34	43.38
Aug.	32.36	39.33	41.89	58.12	65.17	64.41	47.97	46.60	30.00	25.73	22.98	44.71	51.99	50.46	42.57	59.40	43.26
Sept.	32.36	41.60	49.24	58.27	68.89	61.43	48.06	45.32	29.59	24.51	24.76	46.46	51.52	49.05	44.77	58.64	43.40
Oct.	34.61	41.80	50.60	62.24	70.36	58.49	48.99	42.25	26.76	22.72	23.91	47.95	51.01	51.25	44.95	51.52	45.25
Nov.	36.76	44.09	54.25	63.30	70.75	57.49	50.76	40.18	25.87	22.78	23.31	53.14	51.24	51.88	51.30	43.34	46.29
Dec.	37.48	47.16	56.03	62.94	68.68	58.54	50.23	39.87	25.01	21.28	22.70	52.91	50.92	49.77	51.85	42.96	*46.10
Aver.	*32.51*	*42.68*	*50.19*	*57.90*	*64.29*	*64.52*	*50.39*	*45.16*	*31.63*	*24.43*	*21.98*	*39.12*	*52.23*	*50.39*	*46.42*	*54.29*	*42.27

Aluminum (No. 1 Virgin, 99 Per Cent Plus), at New York, Cents a Pound, Less-than-ton Lots

	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938
Jan.	17.74	22.75	27.61	27.00	27.00	26.37	23.90	23.90	23.90	20.50	19.50	19.00	19.75	21.00	21.00	21.00	21.00
Feb.	17.33	23.25	27.71	27.00	27.00	25.83	23.90	23.90	23.90	20.50	19.50	19.00	19.75	21.00	21.00	21.00	21.00
March	17.52	24.95	27.57	27.00	27.00	25.55	23.90	23.90	22.90	20.00	19.00	19.00	20.00	21.00	21.00	21.00	21.00
April	18.07	26.00	27.46	27.00	27.00	25.55	23.90	23.90	20.50	19.50	18.50	19.50	20.00	21.00	21.00	21.00	21.00
May	17.92	26.24	26.43	27.00	27.00	25.55	23.90	23.90	20.50	19.50	18.00	19.50	20.50	21.00	21.00	21.00	21.00
June	17.87	26.25	26.27	27.00	27.00	25.55	23.90	23.90	20.50	19.50	18.00	19.50	21.00	21.00	21.00	21.00	21.00
July	17.87	26.25	26.37	27.00	27.00	25.55	23.90	23.90	20.50	19.50	18.00	19.50	21.00	21.00	21.00	21.00	21.00
Aug.	17.87	26.07	26.52	27.00	27.00	25.55	23.90	23.90	20.50	19.50	18.00	19.50	21.00	21.00	21.00	21.00	21.00
Sept.	18.26	25.50	27.24	27.00	27.00	25.55	23.90	23.90	20.50	19.50	18.00	19.50	21.00	21.00	21.00	21.00	21.00
Oct.	20.32	25.50	27.16	27.24	27.00	25.29	23.90	23.00	20.50	19.50	18.00	19.50	21.00	21.00	21.00	21.00	21.00
Nov.	20.87	25.80	27.00	28.00	27.00	24.30	23.90	23.90	20.50	19.50	18.00	19.50	21.00	21.00	21.00	21.00	21.00
Dec.	22.52	26.31	27.00	28.00	26.85	24.26	23.90	23.90	20.50	19.50	18.50	19.50	21.00	21.00	21.00	21.00	*21.00
Aver.	*18.68*	*25.41*	*27.08*	*27.19*	*26.99*	*25.41*	*23.90*	*23.90*	*21.27*	*19.71*	*18.42*	*19.38*	*20.58*	*21.00*	*21.00*	*21.00*	*21.00

*December estimated.

*Monthly Average Scrap Prices Computed from

No. 1 Heavy Melting Steel

Average of Pittsburgh, Chicago and

	1903	1904	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919
Jan.	$19.75	$11.40	$16.19	$16.51	$18.12	$11.85	$15.84	$16.90	$12.50	$11.77	$14.02	$10.29	$10.27	$16.46	$21.73	$29.93	$17.77
Feb.	19.82	12.31	15.79	15.52	17.50	13.54	14.92	16.42	13.15	11.46	13.06	11.39	10.39	16.10	21.35	29.92	14.75
March	20.02	13.17	15.99	14.50	17.62	12.58	13.27	16.10	13.43	11.71	13.10	11.10	10.78	17.28	23.60	29.58	14.52
April	20.20	13.19	15.98	14.98	17.48	12.20	13.20	15.69	12.63	12.44	13.39	10.83	10.61	17.42	26.63	28.47	15.79
May	19.81	11.46	14.50	14.93	17.55	12.08	14.33	14.54	12.07	12.85	12.30	10.60	10.79	16.47	27.63	28.79	15.06
June	19.00	10.65	13.47	14.84	17.79	12.67	15.33	14.23	12.06	12.94	11.60	10.57	10.78	15.25	37.21	28.87	16.54
July	18.33	10.29	13.97	14.92	17.27	13.27	15.25	13.67	12.21	12.82	11.42	10.50	11.65	15.19	36.00	29.00	19.13
Aug.	17.29	10.79	14.52	15.78	16.57	13.73	16.06	13.43	12.50	13.19	11.46	10.42	13.00	15.35	31.30	29.00	20.25
Sept.	15.62	11.13	15.32	17.11	16.21	14.15	16.93	13.50	11.94	13.73	11.35	10.30	13.79	15.67	31.50	29.00	18.87
Oct.	13.98	12.00	15.85	17.28	15.72	14.55	17.46	13.44	11.27	14.90	11.00	9.71	13.62	16.90	26.60	29.00	18.67
Nov.	12.12	13.85	16.75	18.07	13.48	15.56	17.17	13.30	11.02	14.69	10.39	9.13	14.63	20.40	27.83	28.50	20.50
Dec.	10.48	15.52	16.79	18.88	12.00	16.32	17.17	12.75	11.52	14.00	9.97	9.50	16.20	24.13	28.87	25.00	22.77
Aver.	*17.20*	*12.15*	*15.43*	*16.11*	*16.44*	*13.54*	*15.58*	*14.50*	*12.19*	*13.04*	*11.92*	*10.36*	*12.21*	*17.22*	*29.19*	*28.76*	*17.89*

Scrap Prices at Pittsburgh, Gross Ton

No. 1 Heavy Melting Steel

	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938
Jan.	$15.50	$14.30	$21.80	$21.38	$21.50	$18.63	$16.88	$15.10	$19.31	$16.69	$13.19	$10.22	$8.30	$13.00	$13.35	$14.44	$19.50	$14.25
Feb.	16.00	14.00	23.25	20.88	19.50	17.50	16.13	14.94	18.63	16.81	12.88	10.25	8.50	14.00	13.06	14.96	19.81	14.13
March	14.00	15.13	25.38	19.38	18.50	17.55	16.55	14.81	18.44	16.56	12.80	10.25	8.88	14.44	12.19	15.75	23.15	13.67
April	12.63	16.38	25.88	16.20	17.00	16.63	16.50	15.31	18.60	15.95	12.39	10.12	10.00	14.19	11.55	15.75	22.25	12.44
May	13.30	17.30	22.80	15.63	16.75	15.69	15.40	15.25	17.88	15.25	11.25	9.60	11.75	12.80	11.62	14.50	19.38	11.50
June	12.69	17.00	21.13	16.00	17.30	15.75	14.81	14.56	18.25	15.13	10.30	8.75	11.75	11.75	11.75	13.57	18.45	11.30
July	12.00	17.38	18.10	17.50	18.00	16.81	15.00	14.10	18.55	14.75	10.56	8.25	12.72	11.75	11.95	14.19	19.75	14.25
Aug.	12.79	17.75	17.75	17.50	18.88	17.50	15.40	15.50	19.00	15.13	10.69	8.60	13.85	11.31	12.94	15.94	21.85	15.45
Sept.	13.63	20.13	17.88	18.10	18.70	17.88	15.50	16.56	18.31	15.60	10.65	9.54	12.94	10.75	13.25	17.80	19.62	15.25
Oct.	14.13	21.40	15.70	18.50	18.50	17.25	14.75	17.60	17.30	14.56	10.22	9.62	12.15	10.35	13.40	17.87	16.62	15.00
Nov.	14.30	20.50	16.13	19.63	19.50	17.20	14.25	17.19	16.39	13.19	10.22	9.15	11.50	10.94	13.56	17.31	13.75	15.28
Dec.	14.25	20.13	18.75	21.40	19.10	16.75	14.88	17.90	15.45	12.75	10.25	8.75	12.13	13.01	14.05	18.31	13.75	15.75
Aver.	*13.76*	*17.62*	*20.38*	*18.61*	*18.60*	*17.10*	*15.50*	*15.74*	*18.01*	*15.20*	*11.28*	*9.42*	*11.21*	*12.36*	*12.72*	*15.87*	*18.86*	*14.02*

Machine Shop Turnings

	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938
Jan.	$10.00	$9.60	$16.90	$15.75	$17.50	$14.30	$12.00	$10.80	$11.50	$11.50	$6.00	$6.50	$6.25	$8.70	$8.70	$ 9.87	$14.00	$8.22
Feb.	10.00	9.56	18.50	16.13	15.88	13.63	11.38	10.88	11.50	11.39	6.44	6.50	6.25	10.25	8.75	10.25	14.00	8.25
March	9.40	10.50	20.38	14.50	14.20	13.35	12.00	10.25	10.63	10.94	7.65	6.75	6.25	11.00	7.31	10.50	14.50	7.75
April	8.13	11.88	20.50	12.45	13.39	12.00	12.63	10.44	11.15	10.90	7.06	6.56	6.81	10.38	7.30	10.50	14.37	7.50
May	8.70	13.30	19.20	11.88	12.25	11.00	11.30	10.20	11.06	10.19	6.57	6.00	8.30	8.35	8.06	9.69	14.31	6.75
June	7.56	13.32	17.19	13.00	13.05	11.00	10.50	9.00	11.63	9.56	6.50	5.12	8.38	7.25	8.12	9.05	13.85	6.55
July	7.00	14.00	12.10	13.50	13.63	11.38	11.50	9.10	11.90	8.60	6.75	4.75	9.50	7.50	8.10	9.37	14.25	8.50
Aug.	7.85	14.00	11.44	14.13	15.00	12.80	11.80	9.88	13.00	8.00	7.00	5.30	10.50	7.50	8.88	10.62	15.65	9.80
Sept.	9.06	14.75	12.88	14.40	14.75	13.06	11.63	11.13	12.06	8.00	7.30	6.00	10.00	7.13	9.50	12.20	14.50	9.75
Oct.	9.56	16.20	11.60	14.25	14.39	12.06	11.50	11.10	11.75	6.88	7.00	6.00	9.30	6.75	9.50	12.25	11.62	9.75
Nov.	9.85	16.63	11.63	15.94	15.00	11.90	11.10	11.00	11.00	6.00	6.94	6.00	7.75	7.13	9.44	11.50	8.45	9.75
Dec.	8.88	15.63	13.75	17.20	14.30	11.50	11.00	11.10	10.25	6.00	6.70	6.12	8.00	8.70	9.60	12.37	7.50	10.00
Aver.	*8.83*	*13.28*	*15.61*	*14.43*	*14.44*	*12.34*	*11.53*	*10.41*	*11.45*	*8.98*	*6.83*	*5.97*	*8.11*	*8.39*	*8.61*	*10.68*	*13.08*	*8.65*

Cast Iron Borings

	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938
Jan.	$13.00	$10.90	$18.40	$16.94	$17.50	$14.88	$12.50	$11.30	$12.88	$11.25	$7.50	$6.50	$5.50	$7.50	$6.35	$8.50	$14.00	$6.94
Feb.	12.00	11.06	19.50	16.88	15.88	14.13	12.13	11.00	12.50	11.56	7.50	6.50	5.50	7.88	6.75	8.75	14.00	7.00
March	11.45	11.94	21.13	15.38	14.10	13.30	12.50	10.50	12.25	11.00	7.70	6.70	5.50	8.50	6.37	10.50	14.40	6.25
April	9.38	13.38	21.88	13.00	13.39	12.50	12.38	11.00	12.45	10.55	7.50	6.56	5.88	8.50	6.00	10.50	14.25	6.25
May	9.70	14.10	20.20	12.75	12.50	11.75	11.10	10.90	12.00	10.39	7.63	6.10	7.30	8.10	6.00	10.12	14.00	6.25
June	8.38	14.63	17.88	14.00	13.05	11.90	10.50	10.39	12.25	9.88	6.75	5.12	7.88	7.00	6.25	10.00	14.30	6.10
July	7.63	16.00	15.20	13.80	13.63	12.38	10.63	10.00	12.40	8.90	7.25	4.50	9.25	7.00	6.30	10.00	14.87	6.63
Aug.	8.30	15.70	13.88	14.75	15.00	12.75	11.00	10.75	12.75	8.50	7.56	5.30	9.95	7.00	6.63	10.62	15.45	8.00
Sept.	9.00	17.00	15.63	14.90	14.75	12.94	11.00	12.13	12.25	8.65	7.20	6.00	8.88	6.75	7.00	12.30	14.87	8.50
Oct.	10.13	18.60	13.50	15.00	14.39	12.50	11.00	12.50	12.25	8.00	7.25	6.00	8.20	5.50	8.00	12.50	12.75	8.50
Nov.	10.40	17.85	12.75	15.13	15.00	12.90	11.00	12.13	11.63	7.75	6.94	6.00	7.75	5.25	8.00	12.25	8.55	8.50
Dec.	9.25	17.50	14.88	16.70	14.90	12.13	11.13	12.00	10.75	7.40	6.70	5.50	7.50	5.40	8.00	12.87	6.75	8.50
Aver.	*9.88*	*14.89*	*17.07*	*14.94*	*14.61*	*12.84*	*11.57*	*11.22*	*12.20*	*9.49*	*7.29*	*5.89*	*7.42*	*7.03*	*6.80*	*10.74*	*13.18*	*7.28*

No. 1 Cast Cupola Scrap

	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938
Jan.	$25.00	$16.30	$23.30	$21.00	$19.63	$17.50	$16.00	$14.50	$16.00	$14.00	$12.00	$9.50	$8.60	$11.40	$12.80	$14.00	$17.12	$16.25
Feb.	22.75	16.00	24.75	21.38	20.13	17.00	15.56	14.50	15.00	14.00	12.00	9.50	8.50	12.25	13.37	14.00	17.50	16.25
March	21.20	15.94	26.75	20.25	18.60	17.00	15.80	14.50	15.13	14.00	12.00	9.20	8.50	13.50	12.50	14.80	19.20	15.55
April	18.00	16.88	27.75	18.50	17.75	16.50	16.00	14.50	14.39	14.00	12.00	9.00	8.75	13.50	12.00	15.00	20.00	14.33
May	18.00	18.50	26.30	17.88	17.50	16.50	15.70	14.50	15.50	14.00	10.75	8.90	9.90	12.80	12.63	15.00	19.37	13.88
June	16.63	18.75	24.13	17.25	17.10	15.90	15.13	14.25	15.50	14.00	10.00	8.50	10.00	12.00	13.00	14.60	18.30	13.45
July	16.00	19.00	21.10	17.80	17.00	15.75	15.00	14.25	15.50	13.00	10.00	8.87	10.63	12.00	13.00	14.50	19.25	14.63
Aug.	16.20	19.00	21.38	18.00	17.50	16.80	15.00	14.50	15.50	13.00	10.50	9.00	11.50	11.75	13.44	15.50	20.25	15.25
Sept.	16.88	22.13	21.75	18.00	17.40	16.50	15.00	14.94	15.50	13.00	10.10	9.50	11.50	11.50	14.00	15.90	19.75	15.44
Oct.	17.50	24.00	19.50	18.00	17.39	16.00	14.75	15.40	15.50	12.88	9.50	9.50	11.50	11.00	14.00	16.00	18.38	15.50
Nov.	17.10	23.13	18.63	18.13	18.00	16.30	14.35	15.00	15.13	12.13	9.50	9.10	11.00	11.19	14.00	16.00	16.65	15.50
Dec.	16.13	22.38	20.00	19.10	17.70	16.00	14.38	14.80	14.50	12.00	9.50	9.00	11.00	12.25	14.00	16.50	16.25	15.50
Aver.	*18.45*	*19.33*	*22.95*	*18.77*	*17.98*	*16.48*	*15.22*	*14.64*	*15.34*	*13.33*	*10.65*	*9.13*	*10.12*	*12.09*	*13.23*	*15.15*	*18.50*	*15.13*

Compressed Sheets

	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938
Jan.	$23.00	$13.00	$11.80	$20.50	$18.88	$20.00	$17.63	$15.50	$14.15	$18.81	$16.39	$12.50	$9.56	$8.00	$12.35	$12.75	$14.19	$19.25	$14.25
Feb.	23.75	13.00	12.00	21.75	19.63	18.00	16.13	15.06	14.06	18.31	16.19	12.56	9.56	8.13	13.44	12.63	14.69	19.56	14.13
March	23.00	12.00	13.13	23.75	17.50	17.35	15.60	15.45	14.56	18.25	15.75	12.55	9.70	8.44	14.13	11.87	15.50	22.90	13.67
April	22.13	10.50	14.63	24.75	14.60	15.63	15.25	15.56	14.94	18.55	15.60	11.94	9.50	9.50	13.88	11.10	15.50	22.00	12.44
May	22.00	10.80	15.10	24.30	13.75	15.46	14.75	14.40	14.90	17.81	15.06	10.88	8.95	11.15	12.45	11.19	14.25	19.37	11.50
June	22.00	10.13	15.13	19.88	14.38	16.30	14.60	13.75	14.25	18.13	14.81	9.75	8.12	11.50	11.00	11.25	13.35	18.30	11.30
July	21.50	9.38	15.50	16.90	15.70	16.63	15.50	14.31	13.60	18.25	14.65	10.06	7.50	12.10	11.00	11.55	13.81	19.75	14.25
Aug.	23.90	10.00	16.10	16.13	16.00	17.39	16.40	14.45	14.75	18.44	14.94	10.13	7.80	13.05	10.81	12.69	15.69	21.80	15.45
Sept.	24.25	10.06	17.88	16.00	16.55	17.40	16.50	14.50	16.39	18.19	14.95	10.35	9.25	12.63	10.44	13.00	17.55	19 88	15.25
Oct.	22.75	12.00	19.50	14.30	16.50	17.39	15.63	14.50	17.15	17.15	14.19	9.63	9.12	11.90	10.10	13.20	17.50	16.63	15.00
Nov.	19.80	12.00	19.50	14.25	17.75	18.00	16.00	13.70	17.00	16.13	12.81	9.75	8.65	11.25	10.63	13.31	17.06	13.75	15.25
Dec.	14.75	11.69	19.38	16.50	19.40	18.00	15.56	13.94	17 80	15.15	12.00	9.80	8.31	11 63	12.44	13.90	18.06	13.58	15.75
Aver.	*21.90*	*11.22*	*15.80*	*19.08*	*16.72*	*17.27*	*15.80*	*14.59*	*15.30*	*17.77*	*14.78*	*10.86*	*8.83*	*10.78*	*11.89*	*12.37*	*15.60*	*18.90*	*14.02*

*December, 1938, prices do not include quotations in Dec. 29 issue.

Weekly Quotations in THE IRON AGE

Scrap Composite Price

Philadelphia Quotations, Gross Ton

	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938
Jan.	$25.13	$14 04	$12.45	$20.22	$19.15	$20 10	$16 97	$15 17	$13.70	$17 02	$14 65	$11 30	$8 41	$6.77	$11.73	$12 29	$13 47	$18 33	$14 00
Feb.	26 00	15.21	12.46	21 46	19 21	18 27	15 50	14 58	13 71	16 96	14 92	11 15	8.27	6 83	12 25	11 98	14 12	19 27	13 86
March	25 50	13 17	13 46	24 79	17.56	16 92	15 83	14 65	13 65	16 71	14 88	11 10	8 23	6.96	12 82	11 06	14 75	21 25	13 46
April	24 42	11.63	14.71	24 00	15 20	15 48	15 27	14 71	13 81	17.18	14 30	10 83	8 12	7.73	12.54	10 46	14 59	21 02	12 40
May	23 71	12.20	15 67	20 77	14 71	15 46	14 35	13 95	13 90	16 54	13 71	9 94	7 48	9.70	11 57	10 70	13 39	18 54	11 54
June	23.47	11.47	15 52	18 94	14.88	16 09	14 40	13 60	13 52	16.39	13 31	9.39	6.89	9.97	10 67	10.74	12 81	17 28	11.32
July	24 21	11 00	15 92	17.23	16 00	16 46	15 42	13 48	13 13	16 60	13 08	9.25	6 46	11.27	10 53	10 96	13.29	18 79	13.29
Aug.	25 88	11.57	16 30	16 58	16 58	17.23	15 88	13 80	13 75	16 86	13 29	9.25	6 93	12 08	10 15	12 25	15 04	20 43	14 51
Sept.	26 53	12.15	18 33	16 98	17 20	17 42	16 25	13 92	14 75	16 60	13 70	9 12	7.69	11.35	9 63	12.71	16 45	18 73	14 34
Oct.	23 73	12 88	19.20	15.15	17 08	17 08	15 58	13 48	15 85	15 78	12.77	8.78	7.62	10 56	9 54	12 67	16 63	15 89	14 21
Nov.	20 00	12.73	18 02	15.13	18 17	17 63	15.25	13 18	15 73	14 83	11 69	8.74	7.45	9 94	10.04	12.90	16 31	13 34	14.74
Dec.	15 92	12.29	17.94	17.37	20.08	17.37	15.08	13 48	15.97	14.15	11.28	8 61	6.92	10.50	11.43	13 33	17.10	13 46	14.86
Aver.	*23.71*	*12.61*	*15.83*	*19.05*	*17 15*	*17.12*	*15.48*	*14 00*	*14.29*	*16.50*	*13.46*	*9.80*	*7.54*	*9.47*	*11.07*	*11.85*	*14.75*	*18.08*	*13.54*

Low-Phosphorus Scrap (Billet and Bloom Crops)

	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938
Jan.	$24 00	$17.60	$25 30	$23 60	$26 50	$24 00	$21 00	$18 50	$22 00	$20 88	$17 25	$13 00	$10 70	$15 70	$15 00	$16 88	$24 50	$18 25
Feb.	23 75	17.13	27 50	25 13	24 75	22 25	20 25	18 50	22 00	21 25	18 00	13 00	10 50	16 25	15 00	17 12	25 50	18 25
March	21 60	17.38	32 00	24 00	23 30	22 00	20 30	18 50	22 50	21.50	18 00	13 00	10 50	17 00	14 62	18 00	26 90	18.25
April	18 63	18 88	32.25	19 40	22 13	21.13	21 00	18 50	23 45	21 40	17.50	13 00	11 00	17 00	14 55	18 00	27 50	17 50
May	18 10	20 00	28 60	19.50	21.63	20 00	20 00	18 60	22.50	19 88	15 00	12 40	13 80	16 20	14 94	17.62	25 87	16 12
June	16 88	20.00	25 88	20.13	22.00	20 00	19 25	19.00	22.25	19.13	14 10	10 87	14.00	15.25	15 00	17.50	25 00	15 00
July	15 88	20 13	22 00	20 90	22 00	20 75	19 00	19 00	22 45	19 20	14 50	10 50	15 00	15 00	15.00	17 50	25 00	16 50
Aug.	16 50	21.20	23 50	21.88	22 25	21 00	19 00	19 13	23 00	19 33	14 50	10 50	16 80	14.25	15 50	18 62	26 85	17.75
Sept.	17 25	21.25	24 38	22.60	23 00	21 67	20 00	19 88	22.39	20 00	14 30	10 50	15 75	13 50	16 12	20 50	25 12	17 75
Oct.	17 50	25.00	21.90	23 00	23 13	20 50	19.25	20 20	21.75	18 75	13 50	11 00	15 20	13 00	16 50	21.00	21 37	17 75
Nov.	17 30	24 00	20 50	23.25	24 00	20 60	18 30	20 50	21 13	17.13	13 00	11 50	15 00	13 81	16 50	21 00	18 05	17 75
Dec.	17.00	24.00	21.75	25.13	24.00	21.13	18.50	21.00	20 75	17.00	13 00	11.00	15.06	14.81	16.50	22.12	18 25	17.75
Aver.	*18.70*	*20.80*	*25.46*	*22.59*	*23.22*	*21.25*	*19.65*	*19 28*	*22.18*	*19.63*	*15.22*	*11.69*	*13.61*	*15.15*	*15.44*	*18.82*	*24.16*	*17.38*

Eastern Pennsylvania Scrap Prices, Gross Ton

No. 1 Heavy Melting Steel

	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938
Jan.	$14 50	$11 60	$19 70	$18 20	$18 50	$17 00	$15 39	$13 50	$16 39	$14 50	$10 50	$7 00	$6.75	$11.70	$11 40	$12 62	$17 37	$14.75
Feb.	14 25	12 00	20 75	18 38	17.63	15 88	14 63	13 50	16 39	14 63	10 50	7.00	6.75	11 75	11 62	13 25	18 50	14 75
March	13 00	12 78	25 25	16 75	15 90	16 00	14 50	13 50	15 13	14 88	10 50	7.00	6 75	11 88	10 50	13 75	19 60	14 55
April	11 25	14 00	23 63	15 30	14 63	16.00	14 50	13 50	17 00	13 95	10 31	7.50	7.19	11 69	10 00	13 69	20 00	13 37
May	11 80	14.75	19 80	14 75	14 63	15 25	14 10	13 50	16 39	13 39	9 69	6 00	8 90	10 95	10 44	12 81	18 62	12 13
June	11 25	15.00	17.88	15.00	15.10	14.70	14 00	13.39	16.00	12.75	9.10	6.00	9 25	10.50	10.50	12.00	17.20	12.20
July	11 00	15 00	16 60	15.40	15 63	14 63	13 39	13 00	16 50	12 50	8 44	6 00	10.68	10.30	10 55	12.31	19 00	13 63
Aug.	11 40	15 20	16 00	16.75	16 38	16 20	13 70	13 00	16 50	12 63	8 69	6 30	11.95	9 94	11 44	14.00	19 75	14 35
Sept.	11 50	16 88	16.75	17.10	17 20	16 88	14 00	14.75	16 39	13 00	8 50	7.25	11.25	9.63	12 38	15 40	19.00	14 25
Oct.	12 06	17 80	15 40	16 63	16 75	16 50	14 00	16 00	15.70	12 38	8 13	7.25	10 20	9.53	12 10	15 75	16 38	14 75
Nov.	11 88	16 25	15 25	17.75	17 38	15.50	13 80	15 50	15 00	11.75	8 00	7 25	9 75	9 94	12 13	15 12	13 75	14.75
Dec.	11.50	16.38	16 75	20.10	17.50	15.50	13.50	15.40	14.50	11.10	7.75	6.75	10.44	10.75	12.50	15.50	14.25	15.08
Aver.	*12.12*	*14.80*	*18.65*	*16.84*	*16.44*	*15.84*	*14.13*	*14.05*	*16.07*	*13.12*	*9.18*	*6.77*	*9.16*	*10.71*	*11.30*	*13.85*	*17.78*	*14.06*

No. 1 Machinery Cast

	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938
Jan.	$23 25	$16 50	$23.20	$20.70	$20 13	$18 39	$17.00	$16 00	$16 31	$15 00	$12.00	$10 00	$8 00	$12.00	$10.90	$13 00	$18 50	$16 75
Feb.	23 00	16 50	24 25	20 25	18 88	17.75	17.00	16 00	16 50	15 00	11 90	10 00	8 00	12.00	11.00	13.00	19 00	15 87
March	19 40	17 13	28 25	18 63	18 00	17 50	17.00	16 00	16 50	15 00	11 50	9 90	8.00	12.75	11.00	14.00	20 40	15 75
April	18 00	17 25	26 25	17 70	17.25	17 50	17 00	16 00	16 50	14.85	11.50	9 75	8 50	12 88	11.00	13 87	22 25	15 63
May	18 00	18 40	24 30	17 00	17.00	17 25	16 80	16 00	16 50	14 00	11.50	8 12	10 25	12.10	11.00	13.50	20 87	14 63
June	17.38	19.00	22.25	17.50	17.50	17.00	16.00	16.00	16.00	13.50	11.20	8.00	10 25	12.00	11.00	13 50	20 00	14 45
July	16 50	17 50	20 40	17.50	17 63	17.00	16 00	15 50	16 50	13 00	11.00	6 50	11 81	11 60	11 00	14.12	20 37	15 75
Aug.	17 00	18 60	20 38	17 88	18 00	17.70	16 00	15 50	16 50	13 00	11 00	8 20	12 50	11.50	11.12	15 19	21 15	16 35
Sept.	17 00	21 50	21 38	18 00	18 00	18 00	16 38	16.25	16 88	13 00	11 00	9 25	12 50	11 50	11 50	16 30	20 38	16 25
Oct.	17 13	22 60	19 50	17 50	18 00	17 39	16 50	17.10	16 00	13 00	11 00	9 50	11 50	11.10	12 10	16 50	19 12	16 75
Nov.	17 50	21 00	19 25	17 88	18 00	17 30	16 13	16 39	15 88	12 00	11 00	9 31	11 25	10 50	12 50	16 50	16 85	16 75
Dec.	16 63	20.25	20.25	19.50	18 13	17.00	16.00	16.25	15.00	12.00	10.10	8.00	11 81	10.50	12 90	16 75	16 58	16 75
Aver.	*18.49*	*18.85*	*22.47*	*18.34*	*18.04*	*17.48*	*16.48*	*16 08*	*16.28*	*13.61*	*11.25*	*8.88*	*10 36*	*11.70*	*11.42*	*14.69*	*19 62*	*15 97*

Cast Iron Carwheels

	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938
Jan.	$25 00	$16 50	$22 30	$20.10	$19 50	$18.13	$16 38	$15 50	$16 50	$15 00	$13 75	$10 75	$8 00	$11 90	$11 50	$13.75	$18 37	$16 25
Feb.	24 00	15 00	24 75	20 38	18 38	17 50	16 00	15 50	16 50	15 00	13 50	10 00	8 00	12 50	12 25	14 50	18 50	15 37
March	18 50	15 94	26 50	18 75	18 50	17 50	16 00	15 50	16 50	15 00	13 40	9 70	8 00	12 88	11 87	14 50	19 30	15 75
April	18 00	15 88	26 50	17 50	17.75	17 50	16 00	15 50	16 50	15 00	12 63	10 00	8 75	13 00	11 00	14 37	21 25	15 57
May	16 80	24.20	17 00	17.00	17 00	17.25	16 00	15.50	16 39	14 88	12.25	8 94	9 75	12 50	11 00	13 62	20 62	14 75
June	18 00	17.13	22 75	17.00	17.00	17 00	15 38	15 50	16 00	14 50	12 00	8.25	10 25	11 38	11.00	13 50	19 50	14 75
July	16 50	17 50	20 40	17 30	17 25	17.00	15 00	15 50	16 39	14 50	12 00	7.00	12 00	11 00	11 00	13 87	19 75	15 25
Aug.	16 40	18 10	20 25	17 75	18 50	17 40	15 30	15 50	16 50	14 63	12 00	8 40	12 75	11 00	11.13	15 25	20 55	17 15
Sept.	17 00	21 75	21 00	18 00	18 50	17 50	15 50	15 88	16 50	15 00	12 00	9 50	12 00	11 00	11 50	16 30	20 62	17 25
Oct.	17 00	22 50	19 60	17.50	18.50	17.13	15 50	16 50	16 50	15 00	12 00	9 75	11 85	10 65	12 30	16 50	19 13	16 75
Nov.	17 20	20 50	17.75	17 88	18 50	16 60	15 50	16 50	15.75	14 38	12 00	9 31	10 75	10 37	12 50	16 50	16 85	16.75
Dec.	16 63	20.00	19 50	19 20	18.50	16 50	15.50	16.50	15 50	14 00	11.50	8 50	11 00	11 30	12 90	16.75	16 25	16 75
Aver.	*18 42*	*18.13*	*22.18*	*18 20*	*18.16*	*17.22*	*15.67*	*15.78*	*16 29*	*14.74*	*12.42*	*9.17*	*10.26*	*11.62*	*11.66*	*14.95*	*19 22*	*16.03*

Scrap Prices at Cincinnati, Net Ton

No. 1 Machinery Cast

	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938
Jan.	$14 00	$20 39	$20.50	$20 12	$19 75	$17.00	$14 30	$17 14	$16 52	$12 60	$10 00	$7.55	$9.50	$10.25	$11 37	$15 75	$11 25
Feb.	13 63	21 75	21 50	19 12	19 39	16 00	14 30	17 24	16 52	12 60	10 00	6 50	9 50	9 94	11.75	16 12	10 87
March	14 05	23 65	20 00	18 35	19 00	16 00	13 85	17 19	16 52	12 60	10 00	6 50	10 00	9 19	12 40	17 30	11 05
April	15 50	24 75	18 00	17 75	17 80	16 00	13 85	17 19	16 52	11 90	10 00	6 50	10 00	8 75	12 19	17 37	10 62
May	16 25	24 05	16 75	17 75	17 00	15 60	13 65	17 19	15 85	11.25	10 00	6 75	9 45	8 87	11 50	14 44	10.25
June	16 25	22 13	17 13	18 15	17 00	15 50	13 60	17.19	15 63	11 25	8 50	7.13	9 00	9.06	11 20	14 00	10 10
July	16 25	20 25	18 25	18 25	17 00	15 50	13 55	17.19	15 63	11 25	8 00	8.75	9.00	9.10	11 19	14 87	11 75
Aug.	17 45	19 05	18 25	19 00	17 63	15 50	13 40	17 05	15 63	11 25	7 50	9 50	8 88	9 94	12 43	16 25	12 65
Sept.	19 88	19 38	18 13	19 25	18 00	15 50	14 20	16 96	13 48	9 45	8 00	9 50	8 75	10 00	13 60	14 25	12 31
Oct.	21 25	18 00	17 68	19 00	17 39	15 50	15 65	16 92	12 95	9 04	8 25	9 50	8 75	10 50	14 00	13 38	12 31
Nov.	20 85	16 85	18 40	20.12	17 00	14 50	16 70	16 57	12 95	8 93	8 25	9 12	8 88	10 50	14 00	11 85	13 15
Dec.	20 75	18 00	18 75	20 00	17 00	14 00	16 50	16 52	12 59	8 93	8 25	9.19	9.85	10 90	15.12	10 75	13.92
Aver.	*17.18*	*20.69*	*18.61*	*18.91*	*17.83*	*15.55*	*14.47*	*17 03*	*15.07*	*10.98*	*8.90*	*8.04*	*9 30*	*9.75*	*13.56*	*14 69*	*11.69*

*Scrap Prices at Chicago

No. 1 Heavy Melting Steel, Gross Ton

	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938
Jan.	$15 13	$11 45	$19 15	$17 69	$19 44	$15 12	$13 25	$12 50	$15 39	$12 75	$10 27	$7.50	$5 25	$10.50	$11 80	$13 37	$17 81	$13 00
Feb.	15 13	11.38	20 33	17 88	17 69	13 88	13 00	12 69	15 88	13 31	10.06	7 25	5.25	11.00	11 25	14.19	19.25	12 69
March	12 50	12 38	23.50	16.56	16 45	13 95	12.90	12.63	15.66	13.19	10.00	7.25	5.25	12.13	10.50	14.75	20.60	12.15
April	11.00	13.75	22.50	14.10	14.81	13.19	13.13	12.63	15 95	13.00	9.81	7.14	6.00	11.75	9 85	14 34	20.56	11.37
May	11.50	14 95	19 70	13.75	15 00	12.13	12 35	12.95	15 39	12.50	8.88	6 45	8.45	11.05	10.06	12 87	17.12	11.00
June	10.81	14.56	17.88	13.63	15.75	12.45	12.00	12 63	14 94	12.06	8.75	5.69	8.91	9.75	9.97	12.85	15.70	10 45
July	10 00	15 25	17.05	14.90	15 60	14.19	12 06	12.30	14.75	12.00	8.75	4 88	10.42	9 55	10.35	13.37	17.62	12.00
Aug.	10.60	15.95	16.00	15.50	16 44	14.00	12.30	12 75	15.06	12.13	8.38	5.75	10.46	9.19	12.38	15.19	19.70	13.75
Sept.	11.31	18.13	16 31	16.40	16 35	14.00	12 25	12 94	15.13	12.50	8 20	6.25	9 84	8.50	12.50	16.15	17.56	13.50
Oct.	12.44	18.40	14.15	16.13	16.00	13.00	11.69	13.95	14.30	11.38	8.00	6 00	9.47	8.75	12.50	16.25	14.69	12 88
Nov.	12 25	17 31	14.00	17.13	16 00	13 00	11 50	14 50	13 15	10 13	8 00	5 93	8 60	9 25	13 00	16 50	12 50	14 20
Dec.	11.13	17.25	16.06	18.95	15.75	13 00	12 06	14.55	12.50	10 00	7.80	5.25	8.94	10.50	13 25	17.00	12.38	13.75
Aver.	*11 98*	*15.06*	*18.05*	*16 05*	*16 27*	*13 49*	*12.89*	*13 09*	*14.84*	*12.08*	*8 91*	*6 28*	*8 07*	*10 16*	*11.45*	*14.74*	*17.12*	*12.88*

Steel Rerolling Rails, Gross Ton

	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938
Jan.	$15.63	$12.10	$20 40	$18 88	$21.75	$17.50	$16 38	$14 90	$17.00	$14 63	$12.50	$10.50	$7 50	$11 30	$12.60	$14.12	$19.50	$15.50
Feb.	15 50	12.00	21 75	20 13	19.25	16 63	15 94	15 00	17 50	15.00	12 00	10.50	7 50	11.81	12 50	15.19	21.00	15 50
March	13 30	13 31	24.63	19 13	17.86	16.50	15.60	14 44	17.50	15 00	12.00	9 85	7 50	12.62	11 88	15 50	22 30	15.40
April	12 63	14 50	23 75	16 30	16 00	16 13	16 00	13 81	17 50	15 00	11 75	9 00	7 88	12 50	11 30	15 19	23 12	14 63
May	13 40	15 70	21 70	15 00	16 88	15 19	15 20	14 40	17 50	14 81	10 69	8 30	9 30	11 90	11 00	14 31	21 62	14 25
June	12 94	15.25	19.25	14.81	17 85	15.45	14 75	14 81	17.50	14 63	8 40	7 31	9.63	10.50	10.62	14.00	19.40	13.70
July	12.25	16.13	18.00	15.50	17 44	17.19	14 88	14.75	17.50	14 50	10.39	6.63	11.32	10.35	11.30	14.37	20.75	15.13
Aug.	12 45	16 90	17.50	16 19	19 00	17 10	15.30	15.13	17.75	14 50	10 13	6.75	12.00	10.00	13.12	15 69	21.75	18 15
Sept.	13.13	19 38	17 38	17.30	19 25	17.39	15.19	15 88	17 81	14 40	10 00	7.19	11 38	10 00	13.50	16 50	20 56	18 00
Oct.	14 00	20 30	15 80	17.06	18 88	16.63	14.88	16.50	17.20	13.88	10.00	8.00	10.88	10.00	13.50	17.00	17.19	17.25
Nov.	13 80	18 38	15 06	18 19	19 44	16.50	14 50	16 63	15 50	12 50	10 25	8 00	9 90	10 06	13.75	17 00	15.05	17.50
Dec.	12.63	17.75	17.00	20 36	19.10	16 19	14.63	16 60	14.60	12 50	10.50	7.50	10.00	10 95	13.80	17.25	15.13	17.42
Aver.	*13.47*	*15.98*	*19.35*	*17.40*	*18.56*	*16.53*	*15.27*	*15.24*	*17.07*	*14.28*	*10.72*	*8.29*	*9.57*	*11.00*	*12.41*	*15.51*	*19.78*	*16.04*

Cast Iron Borings, Gross Ton

	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938
Jan.	$10 92	$6 38	$15.57	$13 58	$15 56	$13 39	$10.06	$10.40	$12 50	$9 56	$5 06	$3 38	$3.00	$6.30	$6.80	$6 00	$10 00	$6.56
Feb.	11.76	6 93	16.59	15 55	14 63	12.06	10.13	10 13	12 00	10 13	4.75	4.25	3.19	6.56	7.00	6.75	10 87	6 31
March	8 40	8 05	18 91	14 38	13 85	11.75	10 20	9.63	10 63	9 56	4.75	4.20	3.25	7.44	5.94	7.50	12.20	5 65
April	7.28	9.24	17.92	11 40	10 94	10 94	10 44	9.31	10.40	9.25	4 50	3.75	3.88	7.25	5.20	7.00	12 37	4.38
May	6.61	10 98	16 24	10 00	10 00	9 75	10 00	9 25	10 19	8 81	3 75	3 25	5 00	6.45	5 00	6.12	10.75	4.00
June	5.60	11.63	14.43	10.06	10.70	9 95	9 56	9 00	9.88	8.00	3.75	2.63	5.25	5.00	5.00	6 00	10 00	3 85
July	5.32	12.67	13.66	10 45	11.13	11.19	9 94	9 05	7 90	7.90	3 75	2 00	6 25	4.90	5.30	6 12	11.25	5.25
Aug.	5 38	12 88	12 04	10 69	12 75	11.45	10 50	9.31	10 19	7 75	3 94	3.05	6.50	5 00	6 37	7 62	12.15	7 15
Sept.	5.60	14 43	12 19	11 80	13 15	11 19	10 75	9 75	10 50	7 35	4.10	3 88	6.25	4 88	6 00	9 00	10 75	6 63
Oct.	6 44	14 90	10 42	11 56	12 75	8 88	10 13	10.75	10 00	5.75	4.00	3 88	5 88	4.50	6 00	9 25	9 69	5.75
Nov.	6 83	14 56	10 08	12 63	13 19	9 20	9 60	11 69	9 25	4.13	4 00	3 65	5.15	4 81	6.25	9 50	7 85	5.70
Dec.	6 09	14 56	12 04	14 36	13 50	9 50	10 19	11 85	9 15	4 90	3.60	3 06	5 50	6 00	6.10	9 50	7 59	5.50
Aver.	*7.19*	*11.43*	*14.17*	*12.21*	*12.68*	*10 77*	*10 13*	*10.01*	*10 37*	*7.76*	*4 16*	*3 41*	*4.93*	*5.75*	*5.91*	*7.53*	*10.45*	*5.56*

Cast Iron Carwheels, Gross Ton

	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938
Jan.	$21 00	$15.30	$26.70	$20 50	$21 38	$18.00	$15 31	$13 90	$14 13	$13 81	$11 00	$8 19	$7 55	$10 70	$11 90	$13.19	$18 25	$15.50
Feb.	20 63	15 00	27.25	21.00	19 38	17 13	15.13	14 00	14 50	14.69	10 50	7 50	7 88	11 44	12.00	13 12	18 81	14 88
March	15 90	16 50	28 38	21 00	17.10	17.00	15 00	13 88	14 50	14 69	10 10	6 95	7 00	12 00	10 89	14 00	20 40	13 90
April	14 06	18 63	27 75	16 70	16 00	16 39	15 00	13 50	14 50	14 45	9 50	7 00	8 06	11 75	10 50	14 00	21 25	13 13
May	14 70	18 50	24 10	16 25	16 06	15 25	14 05	13 45	14 50	13 88	9 13	6 40	9 10	11 15	10 50	13 75	19 37	12 75
June	13 31	18.25	21 88	15 63	17 30	15 30	13 50	13 06	14 39	13 55	10 00	5 69	9 50	9 75	10 50	13 50	18 20	12 20
July	12 75	19.25	20 60	16 40	17 12	16 39	13.75	12 80	14 00	13 50	10 00	5.50	10.00	9 55	10.85	13 62	18 87	13 38
Aug.	12 95	20 60	19 50	17 13	17 50	15 90	14 50	12 75	14 00	13 50	9 75	6 30	10 50	9 50	12 75	15 00	19 75	14 55
Sept.	14 19	23 75	19 75	18 20	17 70	15 25	14 25	13 31	14 00	13 50	9 50	7 00	10 25	9 50	12.75	16 00	18 75	14 00
Oct.	16 50	25 10	17 90	17 63	17 38	14 50	13 56	13 85	14 00	13 13	9 30	7 00	9 88	9 50	12 75	16 50	16 94	13 25
Nov.	16 60	24 63	17 88	18 63	18 31	14 50	13 25	14 25	13 88	12 13	8 75	7 00	9 20	10 00	13 00	16 50	14 95	13 10
Dec.	15.75	24 00	19 75	20.70	18 30	14 50	13 44	14.10	13.60	11 75	8 50	7 00	9 50	11.00	13 25	17 50	15.13	12.50
Aver.	*15 70*	*19.96*	*22.62*	*18 31*	*17 79*	*15 84*	*14.23*	*13.57*	*14 17*	*13 55*	*9.67*	*6 79*	*9 04*	*10.49*	*11 80*	*14 72*	*18 39*	*13.59*

Railroad Malleable Scrap, Gross Ton

	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938
Jan.	$18.69	$16 39	$12.75	$7.00	$5.50	$11.10	$13.70	$15.94	$20.12	$15.00
Feb.	19.39	17 13	11 94	7.00	5.50	11.75	12.75	16 87	20 87	14 37
March	19.39	16 88	11.70	6 65	5 63	12.25	13.06	18 00	22 45	13 40
April	19 35	16 55	11 13	6 38	6.75	12 00	12 80	17 12	21 69	12.63
May	18.56	15.75	10.25	6.00	9 35	11.30	13.00	15 75	19.50	12.25
June	17.81	13.94	9 55	5 19	9.75	9.75	12.50	15.50	19.20	11.70
July	16 85	13.50	9.00	4.63	10.25	9.55	12.35	15.62	20 25	13.00
Aug.	16 94	13.50	8 43	5.10	10.50	9 38	14.50	17.25	20.75	15.90
Sept.	17.00	13.50	7.50	6.75	9.75	8 75	14.75	18.10	18 75	15.13
Oct.	17.00	13.13	7 40	6 38	9 38	9 00	14 65	18 50	15 93	14.25
Nov.	16.39	12.69	7.25	5.50	8.70	9 13	15.31	18.12	14.15	15.10
Dec.	16.10	12.25	7.00	5.50	9.75	11.20	15.75	19.00	14 75	15.00
Aver.	*17.79*	*14.66*	*9.49*	*6.01*	*9.40*	*10.49*	*13.72*	*17.15*	*19.03*	*13.98*

Steel Knuckles and Couplers, Gross Ton

	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938
Jan.	$16 50	$16 00	$12.00	$8 25	$7.00	$11.10	$12 80	$14 00	$19.19	$16.25
Feb.	17.00	16 00	12.00	8.25	7.00	11.69	12 00	15.00	21.00	15.38
March	17.00	15.88	11.80	7.95	7.00	12.62	11 38	16 00	22 60	14.65
April	17.30	15 25	10.56	7.63	6.75	12.25	11 00	15 37	22.75	13 88
May	17.13	14 31	9.75	6.70	9 40	11.45	11 00	14 25	20 12	13.50
June	16.75	13 75	9.75	5.63	9 50	10.00	10 81	14 00	19.60	12.95
July	16.75	13 50	9.75	5.50	10.63	9.90	11 30	14 87	20.50	14 00
Aug.	16 94	13 50	9.32	6.30	11.00	10.00	13.19	17.00	21.75	16.05
Sept.	17.00	13.50	9.00	7.00	10.75	9 88	13.25	18 00	20.75	15.25
Oct.	17 00	13 00	8 70	7.00	10.13	10.00	13 25	18 00	18 69	14.25
Nov.	16 39	12.13	8.50	7.00	9.30	10.50	13 63	18 00	15.90	15.30
Dec.	16 00	12 00	8.45	7.00	9.63	11.50	14.10	18.56	15.88	15.50
Aver.	*16.81*	*14 07*	*9 97*	*7.02*	*9.01*	*10.91*	*12 51*	*16.08*	*19 89*	*14.76*

No. 1 Machinery Cast Scrap, Net Ton

	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932	1933	1934	1935	1036	1937	1938
Jan.	$17.25	$12.90	$21.60	$20.38	$19.88	$17.00	$16.50	$14.50	$15 81	$13.50	$9.50	$7.75	$6 25	$9.50	$10.60	$12.00	$15.87	$12.50
Feb.	18.00	13.25	23.63	21.00	18.75	17 00	16 50	14.50	16 25	13.75	9.50	7.50	6.25	9.50	10.00	12.75	16 25	12.19
March	14.90	14.13	26 25	20.13	18 20	17.00	16 50	14.50	16.00	13.75	9 50	7.20	6.25	9.50	9 38	13.10	17.40	11.65
April	13.25	14 88	25 75	18 40	17.25	16 39	16 50	14.13	16.00	13 50	9.39	7 00	7.06	9.50	9.00	12 50	17.12	10.88
May	13 60	16.20	23.30	17 38	16.88	15 88	15 80	14.00	15.39	12 88	9.00	6.50	8 45	8.90	9.00	12 00	15.25	10.75
June	12.75	16 06	21.75	16.75	17.50	16 15	14.50	13.88	14.75	12.50	9 00	6 13	8 75	7.50	9 00	12 00	15.00	10.45
July	12.25	17 00	19.60	16.90	17.50	17.19	14.50	13.50	14.50	12.00	9.00	6.00	10.63	8.05	9.30	12.12	15.75	12.00
Aug.	12 60	18 60	18 00	17 50	17 63	17 00	14 80	13.94	14.50	12.00	9 00	6 10	10 50	8.00	10.87	13 37	16 55	13.35
Sept.	13.44	21.38	19.63	18.20	17.90	16 88	14.56	14.81	14.50	11.40	8.50	6.25	10.00	8.00	11.19	13.60	14.38	13.00
Oct.	13.88	20.80	18.70	17 50	17.63	16.50	14 25	15.40	14.50	10.63	8.50	6.25	9 88	8.00	11.25	14.00	13.18	12.25
Nov.	13.50	20.25	18 38	17.88	18.19	16.00	13 50	15.50	13.63	9.36	8 50	6.25	8.60	8.25	11.50	14.00	11.65	12.60
Dec.	12 63	19.75	19 75	19 20	17 25	16 13	14.00	15.60	13.50	9 50	8.50	6 25	8 75	9.65	11 80	14.75	12.12	12.50
Aver.	*14.00*	*17.10*	*21 36*	*18.44*	*17.88*	*16 59*	*15.16*	*14.39*	*15.11*	*11.75*	*8.95*	*6.60*	*8.45*	*8.69*	*10.24*	*13.02*	*15 04*	*12 01*

*December, 1938, prices do not include quotations in Dec. 29 issue.

Structural Bookings Reach 14-Month Peak

NEW orders booked by the structural steel industry in November totaled 150,988 tons, the largest monthly total since July, 1937, according to the American Institute of Steel Construction. In October bookings were 138,829 tons and in November, 1937, were 132,835 tons. The accumulative total of bookings for the first 11 months of 1938 is 1,075,171 tons, as compared with 1,529,561 tons in the corresponding period of 1937.

In contrast to the upward trend of new orders, shipments in November declined to 94,979 tons from 97,511 tons in October. In November, 1937, shipments amounted to 130,156 tons. This decrease was in keeping with past experience. In each of the 10 years from 1928 to 1937 inclusive, shipments in November have declined from the October level. In the first 11 months of 1938 shipments aggregated 1,039,892 tons against 1,552,174 tons in the like period of 1937.

Welding Society Sponsors 17 Lectures

CHICAGO — A series of 17 2-hr. lectures on welding covering every phase and type of welding in modern industry is being offered by Armour Institute of Technology, Chicago, under auspices of the American Welding Society The new course, the first lecture of which was presented Dec. 5, 1938, will continue to March 6, 1939, and is open both to members and non-members of the American Welding Society.

Complete in its scope, the course includes arc welding phenomena and equipment, fundamentals and applications of oxy-acetylene welding and cutting, resistance welding, the importance of resistance welding in industry, metallurgy and heat treatment involved in welding, welded elevated tanks, inspection of welds and methods of testing, inspection of welded structures and testing of welding process and operators, structural steel welding, welding technique and applications in the field of stainless steels and stainless irons, welding of pressure vessels, designing and welding large machines and large machine tool structures, and the use of welding in maintenance.

Of special interest are the latest methods of X-ray studies of different types of welds, methods of testing structures, and welding operators, and stress analysis of models to scale made of transparent material using polarized light to show stress distribution.

Included in the faculty of this unique course are K. L. Hansen, consulting electrical engineer; W. B. Browning, process service engineer, Linde Air Products Co.; H. A. Woofter, consulting and designing resistance welding engineer; E. W. Forkner, chief engineer, Federal Machine & Welder Co.; W. A. Pearl, Department of Mechanical Engineering, Armour Institute; H. C. Boardman, research engineer, Chicago Bridge & Iron Co.; W. D. Halsey, assistant chief engineer, boiler division, Hartford Steam Boiler Inspection & Insurance Co.; R. B. Lincoln, director of National Weld Testing Bureau, Division of the Pittsburgh Testing Laboratories; F. H. Dill, welding engineer, mechanical engineering department, American Bridge Co.; E. J. Brady, welding engineer, Hollup Corp.; A. J. Moses, general manager, Hedges Walsh Widener Division, Combustion Engineering Co.; L. J. Larson, consulting welding engineer; A. E. Balsley, welding engineer, Link Belt Co.

Republic Makes Changes In Southern District

EDWARD I. EVANS, formerly general superintendent of the Gulf district, Republic Steel Corp., has been named manager of the district, and C. L. Bransford, formerly general superintendent of the Birmingham district, has been named manager of that district for Republic. These appointments follow the resignation of Wade H. Oldham as manager of Republic's southern district. Because of the division of southern operations into the Birmingham and Gulfsteel districts, Mr. Oldham's position will not be filled.

Lamson & Sessions Dissolves Subsidiaries

THE LAMSON & SESSIONS CO., bolt and nut manufacturers, with plants at Cleveland and Kent (Ohio), Chicago and Birmingham, is simplifying its corporate structure by dissolving two wholly-owned subsidiaries, The Lamson & Sessions Co. and The Lamson & Sessions Bolt Co. As before, sales and manufacturing will be independently managed as separate divisions, by W. M. Olsen as general manager at Chicago and by George S. Case, Jr., as general manager at Birmingham.

Inland Steel Blows In New 1000-Ton Furnace

INLAND STEEL CO. has just completed and put into operation its new blast furnace, which is its fifth and largest, having daily capacity of 1000 tons. The blowing in of the furnace was accompanied by special ceremonies in which officers of the company participated.

With this new furnace, Inland's pig iron capacity is up to more than 1,500,000 tons annually. The completion of the blast furnace was the last step in a program of expansion which has included a new 44-in. continuous strip mill, 59 new coke ovens and five new open-hearth furnaces, which increased steel-making capacity 18 per cent, while rolling capacity in flat rolled steel was raised from 700,000 tons to 1,100,000 tons annually. The company's present steel-making capacity is 2,760,000 tons a year.

Canadian Roads to Place Large Equipment Orders

TORONTO, Jan 3—With the close of the year came the first announcement of equipment orders for the Canadian railroads, which are expected to be the forerunner of business from this source which eventually will total between $30,000,000 and $40,000,000. This first inquiry is from the Canadian National Railways and will involve expenditure of between $8,000,000 and $9,000,000. The equipment includes 10 baggage cars, 5 mail and express cars, 2000 box cars, one ballast spreader, two steam cranes, one locomotive crane. In addition the company will construct in its own shops a number of caboose cars and refrigerator cars. The Canadian Pacific Railway also is expected to enter the market for new equipment, but so far no official announcement has been forthcoming as to the amount involved or the equipment to be purchased.

William B. Pollock History

YOUNGSTOWN — William B. Pollock Co., engineers, fabricators and erectors, has issued a 46-page book entitled, "Seventy-five Years in the Iron and Steel Industry," a history of the company's contribution to the advancement of the art of iron and steel making. The book is profusely illustrated by photographs ranging from 1886 down to the present, including pictures of blast furnaces built, past and present officials of the company, and shop employees.

THIS WEEK ON THE ASSEMBLY LINE

o o o

By W. F. SHERMAN
Detroit Editor

o o o

. . . Holidays and year-end inventories cut assemblies to 75,215 units . . . China buys $2,000,000 worth of trucks for commercial use . . . Mullins Mfg. Corp. to make plumbing ware for Sears, Roebuck & Co.

DETROIT—In a year-end statement, Alfred Reeves, vice-president and general manager of the Automobile Manufacturers Association, confirms the prediction of a probable 1939 output of 3,500,000 cars and trucks He estimated the 1938 production at 2,635,000 units, with production and sale of nearly a million during the past three months, which comprises the first quarter of the new manufacturing year.

Holiday influences again kept automobile production down. Plants closed for inventory, including those of the Federal Motor Truck Co. and the Packard Motor Car Co., accounted for part of the decrease. The total for the week according to Ward's Automotive Report was 75,215 passenger cars and trucks, compared with 92,890 the previous week and 49,550 a year ago. Ford and Mercury production was 16,500 compared with 21,400 a week ago. Lincoln and Lincoln Zephyr output was 640 compared with 800. Chevrolet lost 2900 dropping from 22,900 to 20,000. Plymouth dropped from 10,840 to 8640, working only three days because iced roads made driveaways difficult.

This current week will again feel the effects of the holidays, but some rebound in production is indicated for the next week.

The biggest Christmas gift to the automobile industry came as orders for $2,000,000 worth of trucks and parts were placed with the General Motors Corp. and the Chrysler Corp. by the Universal Trading Co., New York, a recently organized group representing Chinese business interests. The contracts call for delivery of 500 GMC and 500 Dodge motor trucks and were placed by Kwang Pu Chen, head of the Chinese Trade Commission in Washington.

Mullins to Engage in New Line

Mullins Mfg. Corp., which in the automobile industry is regarded as an important supplier of heavy stampings such as fenders, hoods, radiator frames and shells, truck body and cab sections and auto sheet metal parts, and also is an important supplier of large dies, has contracted with Sears, Roebuck & Co. to produce a complete line of drawn and stamped plumbing ware for bathrooms and kitchens. The company is expected to use the large presses in its auto body stamping division to produce bathtubs, wash bowls, laundry tubs, kitchen sinks, etc. These new products will be enameled with fired porcelain in colors. The concern at present produces a variety of stampings such as washing machine tubs, Coca-Cola cabinets, Monel metal kitchen cabinets and refrigerator evaporators.

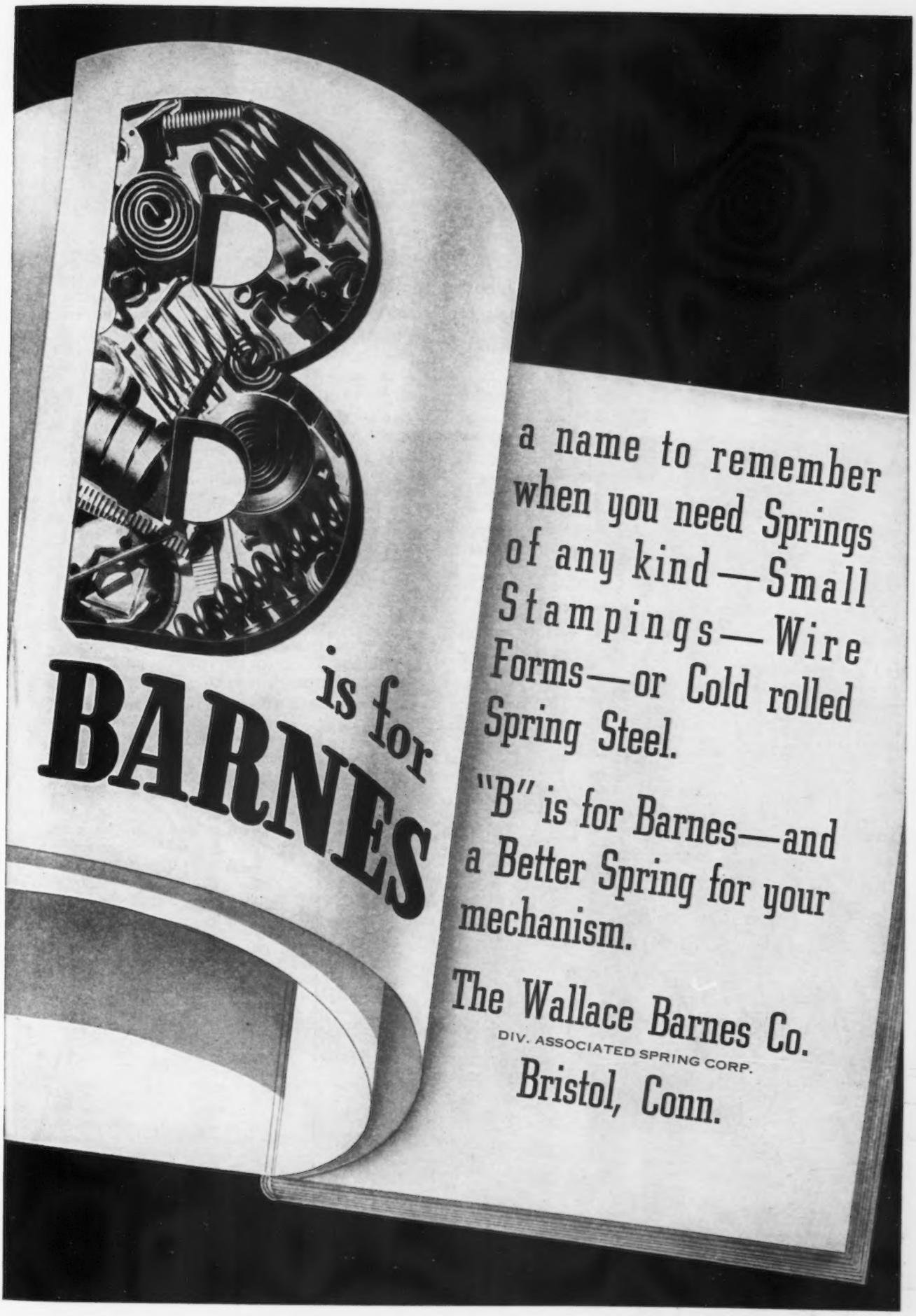
A New Automobile Bearing

Automobile engine designers are being given a chance to test out an entirely new type of bearing which may affect design through greatly reducing bearing areas required to support any given load. Engine life also will be materially improved. The bearings, which have been tested by their manufacturer, have been submitted to automobile companies for tests. It is understood that they are steel-backed, babbitt-lined bearings, with a sandwich layer of a copper alloy. The babbitt, incidentally, is only 0.050 in. thick, so the copper color of the alloy shows through the babbitt.

From another source altogether, comes the comment of a metallurgist, William E. McCullough, Bohn Aluminum & Brass Corp:

"A study of 1939 cars reveals the fact that engineers are taking advantage of the new bearing materials now available. * * * Each particular kind of installation calls for certain characteristics of the bearings metal itself which can be produced by proper alloying and proper heat treatment of a wide range of bearing materials in addition to the original babbitt. * * * Two engines of exactly the same horsepower but of different design may require entirely different bearing materials."

The concerted attack being made on bearings, lubrication and surface finish indicates that there should be important fruits of research offered car buyers before long. It is another phase of the subject we have discussed frequently — important contributions should be forthcoming soon from the engine designers in the automobile industry.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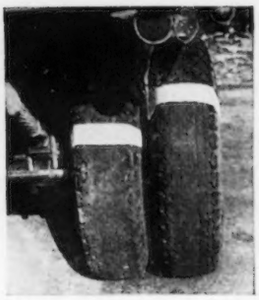

Detroit Company Making Dual Wheels for Trailers

SPECIAL dual wheels for heavy duty trailers have been introduced by the Detroit Compensating Axle Corp., 5124 Braden Avenue, Detroit.

The differential unit incorporated with each set of wheels consists of a special floating hub for the outer wheel which includes an automatic clutch assembly to provide differential braking action on the two wheels. With fixed dual wheels as used on trucks and trailers, both tires must travel at the same rotational speed, although the outer one must cover more ground than its partner. It is estimated that in turning a corner (a 90 deg. turn) about 19 lineal inches of differential action exists between the tires, as shown in the photographs. The result is consistent scuffing and wear from skidding. On a trip around a city block, at least 12 ft. of complete wheel freedom is needed among the four wheels of a trailer axle. Turns in and out of traffic are made under the same conditions and cause excessive tire wear. Even on the straightaway, on average road crowns, the four wheels need almost three inches of differential action in less than a block, tests demonstrate. Besides reducing tire wear, the differential wheels remove the dragging action from the power plant, greatly affecting gasoline economy.

Recently the manufacturer entered into an agreement with Fruehauf Trailer Co. involving the sale of a minimum of 2000 sets of differential dual wheel assemblies. The first delivery was made in December. Fruehauf makes about 40 per cent of the heavy duty trailers produced and sold in this country. Expansion of the axle company's plant will bring its capacity up to 10,000 to 12,000 differential units in 1939.

THE BULL OF THE WOODS — BY J. R. WILLIAMS

THAT ASSISTANT BOSS MUST BE AFFECTED BY THE ATMOSPHERE AROUND HERE, GIVIN' EVERYBODY COLD STARES... IF HE PUT ON SOME WARM CLOTHES IT MIGHT HELP HIS DISPOSITION
HE'S GOT 'EM ON--- DON'T WORRY.... AT LEAST FOUR SUITS OF UNDERWEAR, GOLF SOX AN' STOCKIN' CAP AND POWDER ON HIS NOSE TO KEEP IT FROM SHOWIN' RED... A BOSS HAS TO USE DIPLOMACY-- THIS SHOP ISN'T COLD!
J.R.WILLIAMS
T. M. REG. U. S. PAT. OFF.
COPR. 1938 BY NEA SERVICE, INC.
THE FALSE FRONT
12-30

Foote Bros. Gear & Machine Corp., Chicago, announces the following appointments: A. C. Andrews, 1613 Bryan Street, Dallas, Tex., for IXL gear products and speed reducers in northern Texas; W. M. Lee, 1409 California Avenue, Houston, Tex., as direct factory representative and engineer in the Houston territory; Industrial Engineering Co., Professional Building, Charleston, W. Va., representatives for southern West Virginia.

W. S. Rockwell Co., 50 Church Street, New York, has appointed as representative in western Pennsylvania Firmin & Keown, Commonwealth Building Annex, Pittsburgh, for distribution of industrial heating furnaces.

Allis-Chalmers Mfg. Co., Milwaukee, will establish a new branch office and warehouse in Newark, N. J., Jan. 1, in the Industrial Office Building, 1060 Broad Street. C. A. Pihl has been appointed Newark branch office manager.

OR YOUR PRODUCTION NEEDS

EX-CELL-O PRECISION PRODUCTS

U may improve the performance and reduce the cost of r product with Ex-Cell-O Precision Equipment. In addition machines and tools, some of which are shown here, Cell-O offers seasoned engineering service, to aid in solv- your production problems.

keep up to date on such new developments as precision ead grinding and fine boring, you might like to look over literature. Complete information on all Ex-Cell-O products cluding some not shown here) will be sent on request.

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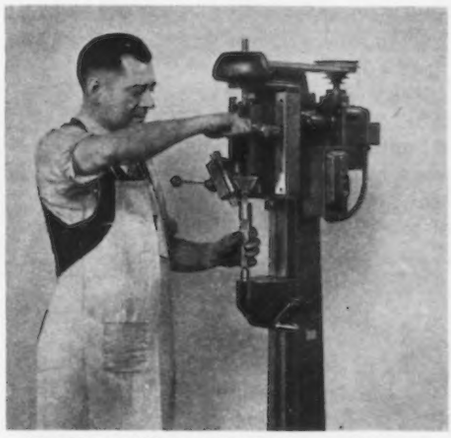
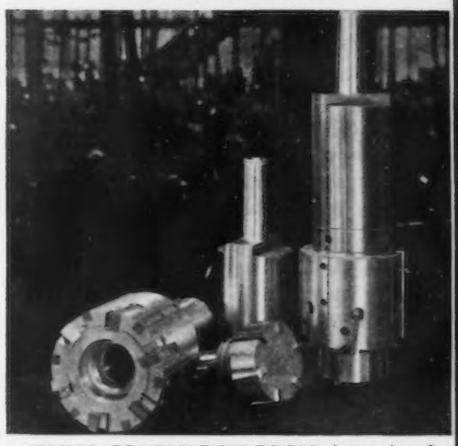


CENTER LAPPING MACHINES for parts that are to be ground on the O. D. to close limits.



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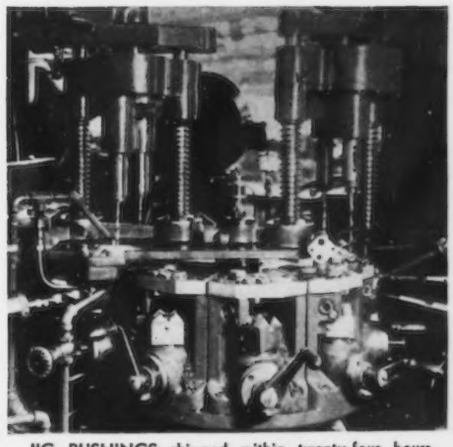

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THIS WEEK IN WASHINGTON

Bethlehem to Oppose CIO-NLRB Move Against Employees' Plan

WASHINGTON — Eugene G. Grace, president of the Bethlehem Steel Co., announced last week that his company will contest the National Labor Relations Board trial examiner's recommendations that Bethlehem's 20-year-old employee representation plan be disestablished at nine plants.

Characterizing the move as the latest phase of the CIO's attempt to force the company's employees to join "an organization which they do not want," the statement added:

"The right of our employees to form their own organizations for collective bargaining and to select representatives of their own choosing is fundamental. We have recognized that right for over 20 years; only recently has it been declared by the National Labor Relations Act.

Up to Our Employees

"With us the desires of our employees are controlling. The trial examiner's report recommends that the existing collective-bargaining organizations of our employees be disestablished. That should be for our employees to decide. They have convincingly shown their desire that those organizations be continued."

An outgrowth of the complaints filed by the Steel Workers Organizing Committee and on which hearings were held at Johnstown, Allentown, Baltimore, and Washington from September, 1937, to July, 1938, the trial examiner's report also recommended that the company discontinue the alleged practice of interfering with union activities of employees and that in the event of non-compliance the NLRB proceed to issue an order directing the company to take such action.

Trial Examiner Frank Bloom, who wrote the intermediate report and who conducted hearings in the case, dismissed allegations that the company had discriminated against three employees who returned to work after the Johnstown strike and also turned down the complaint that the company allegedly employed guards or hired extra policemen for the purpose of intimidating or coercing employees.

No Quarrel with Law

The NLRB announcement reviewed the Johnstown strike which began in 1937, quoted at length from statements made by Bethlehem officials in reference to the employee representation plan both before and after the Wagner Act was upheld by the Supreme Court, and charged that "the respondents have so completely established their control and domination over the (employee representation) plans that the plans are completely incapable of functioning as free and independent labor organizations."

o o o

By L. W. MOFFETT
Resident Washington Editor
The Iron Age

o o o

"I desire to make it clear that Bethlehem has no quarrel with principles of the Labor Act," Mr. Grace said in his statement. "They are not new. They were established at Bethlehem plants 20 years ago and our company welcomes anything that will increase the strength and effectiveness of the application of such principles."

Meanwhile, sentiment appeared to be growing for revision of the Wagner Act as the 76th Congress got under way. Even some members recognized as having championed the cause of labor indicated their dissatisfaction over the Wagner Act and its administration.

Borah for Revision

"The Labor Relations Act, as it was drafted, was definitely a pro-labor act," declared Senator Borah, Republican of Idaho, who both in private life as a lawyer and as Senator has championed labor's cause, announced he would support reasonable amendments to the act aimed at making the NLRB an "impartial" tribunal. "There was much argument that labor's rights needed protection, that capital could take care of itself.

"I am not saying that that was not true to a large extent. But labor has become stronger and more able to take care of its rights, and the law now should be more impartial."

But despite the growing trend in the direction of Wagner Act revision, the belief prevails that criticism will continue to be directed primarily at the three-man board which administers the law and that Congressional agitation will result in a house-cleaning of the present NLRB setup rather than any substantial revision of the act.

Official Origin Ignored

The maladministration of the act, more than the act itself, was sharply attacked by Mr. Grace. He pointed out that the fact that the Bethlehem plan was prepared at the direction of the War Labor Board carried no weight with the trial examiner. At the same time, Mr. Grace stated that the examiner does not deny that the plans were legal and were legally operated until the National Labor Relations Act was passed. Apparently, Mr. Grace said, to the examiner the desires of Bethlehem employees with reference to the plans are of no importance. Likewise, the steel executive declared, their wishes freely expressed are disregarded because they do not agree with what the examiner thinks the employees should have.

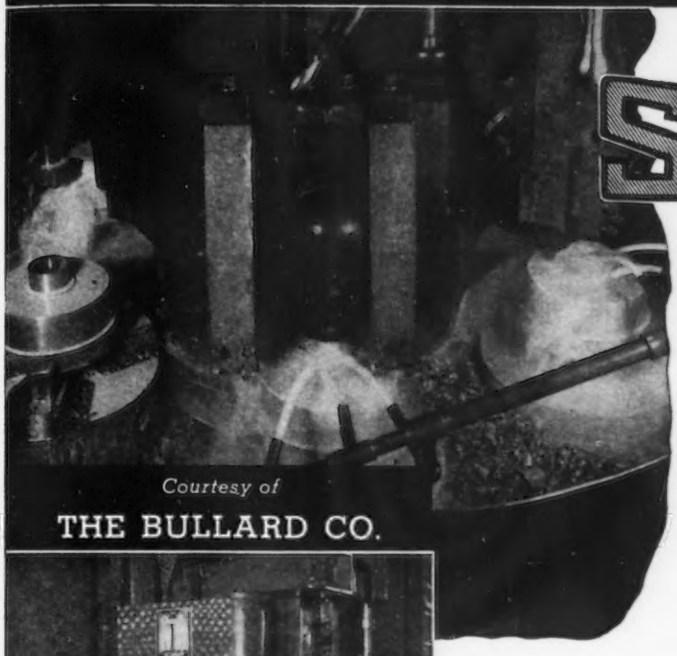
"The report of the examiner makes no constructive suggestion as to how to avoid the chaos that would follow the disestablishment of the existing plans; nor does he suggest that the wishes of the employees be ascertained," said Mr. Grace. "Indeed, CIO does not want to see the issue put to a vote until the employees' present collective-bargaining agencies are thrown into the discard; in other words, CIO wants to compete only with itself.

"In the recommendation to disestablish the plans the report in its entirety is aimed at one thing, and that is to destroy a satisfactory relation which has existed for over twenty years.

"As I look back over the good relations which during many years have been built up between the company and its employees and consider what

(CONTINUED ON PAGE 231)

CHOICE OF THE LEADERS



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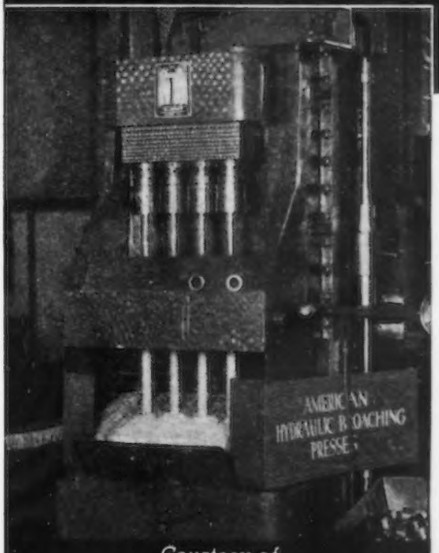

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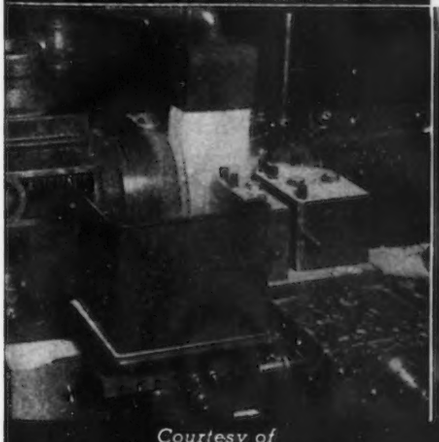

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A Comparison of Prices

Market Prices at Date, and One Week, One Month, and One Year Previous
Advances Over Past Week in Heavy Type, Declines in Italics

Rails and Semi-finished Steel

Per Gross Ton:	Jan. 3, 1939	Dec. 27, 1938	Dec. 6, 1938	Jan. 4, *1938
Rails, heavy, at mill	$40.00	$40.00	$40.00	$42.50
Light rails: Pittsburgh, Chicago, Birmingham	40.00	40.00	40.00	43.00
Rerolling billets: Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham, Sparrows Point	34.00	34.00	34.00	37.00
Sheet bars: Pittsburgh, Chicago, Cleveland, Youngstown, Buffalo, Canton, Sparrows Point	34.00	34.00	34.00	37.00
Slabs: Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham, Sparrows Point	34.00	34.00	34.00	37.00
Forging billets: Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham	40.00	40.00	40.00	43.00
Wire rods: Nos. 4 and 5, Pittsburgh, Chicago, Cleveland	43.00	43.00	43.00	47.00
Skelp, grvd. steel: Pittsburgh, Chicago, Youngstown, Coatesville, Sparrows Point, cents per lb.	1.90	1.90	1.90	2.10

Finished Steel

Cents Per Lb.:	Jan. 3, 1939	Dec. 27, 1938	Dec. 6, 1938	Jan. 4, *1938
Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Birmingham	2.25	2.25	2.25	2.45
Plates: Pittsburgh, Chicago, Gary, Birmingham, Sparrows Point, Cleveland, Youngstown, Coatesville, Claymont	2.10	2.10	2.10	2.25
Structural shapes: Pittsburgh, Chicago, Gary, Buffalo, Bethlehem, Birmingham	2.10	2.10	2.10	2.25
Cold finished bars: Pittsburgh, Buffalo, Cleveland, Chicago, Gary	2.70	2.70	2.70	2.90
Alloy bars: Pittsburgh, Chicago, Buffalo, Bethlehem, Massillon or Canton	2.80	2.80	2.80	3.00
Hot rolled strip: Pittsburgh, Chicago, Gary, Cleveland, Middletown, Youngstown, Birmingham	2.15	2.15	2.15	2.40
Cold rolled strip: Pittsburgh, Cleveland, Youngstown	2.95	2.95	2.95	3.20
Sheets, galv., No. 24: Pittsburgh, Gary, Sparrows Point, Buffalo, Middletown, Youngstown, Birmingham	3.50	3.50	3.50	3.80
Hot rolled sheets: Pittsburgh, Gary, Birmingham, Buffalo, Sparrows Point, Cleveland, Youngstown, Middletown	2.15	2.15	2.15	...
Cold rolled sheets: Pittsburgh, Gary, Buffalo, Youngstown, Cleveland, Middletown	3.20	3.20	3.20	...
Wire nails: Pittsburgh, Chicago, Cleveland, Birmingham	2.45	2.45	2.45	2.75
Plain wire: Pittsburgh, Chicago, Cleveland, Birmingham	2.60	2.60	2.60	2.90
Barbed wire, galv.: Pittsburgh, Chicago, Cleveland, Birmingham	3.20	3.20	3.20	3.40
Tin plate, 100 lb. base box: Pittsburgh and Gary	$5.00	$5.00	$5.00	†$5.35

*Pittsburgh prices only.
†Subject to post-season adjustment.

Pig Iron

Per Gross Ton:	Jan. 3, 1939	Dec. 27, 1938	Dec. 6, 1938	Jan. 4, *1938
No. 2 fdy., Philadelphia	$22.84	$22.84	$22.84	$25.84
No. 2, Valley furnace	21.00	21.00	21.00	24.00
No. 2, Southern Cin'ti	21.06	21.06	21.06	23.89
No. 2, Birmingham	17.38	17.38	17.38	20.38
No. 2, foundry, Chicago†	21.00	21.00	21.00	24.00
Basic, del'd eastern Pa.	22.34	22.34	22.34	25.34
Basic, Valley furnace	20.50	20.50	20.50	23.50
Malleable, Chicago†	21.00	21.00	21.00	24.00
Malleable, Valley	21.00	21.00	21.00	24.00
L. S. charcoal, Chicago	28.34	28.34	28.34	30.24
Ferromanganese, seab'd carlots	92.50	92.50	92.50	102.50

†The switching charge for delivery to foundries in the Chicago district is 60c. per ton.

Scrap

Per Gross Ton:	Jan. 3, 1939	Dec. 27, 1938	Dec. 6, 1938	Jan. 4, *1938
Heavy melting steel, P'gh	$15.75	$15.75	$15.75	$14.25
Heavy melting steel, Phila.	15.25	15.25	14.75	14.75
Heavy melting steel, Ch'go	13.75	13.75	13.75	13.00
Carwheels, Chicago	12.50	12.50	12.50	15.50
Carwheels, Philadelphia	16.75	16.75	16.75	16.25
No. 1 cast, Pittsburgh	15.50	15.50	15.50	16.25
No. 1 cast, Philadelphia	16.75	16.75	16.75	16.75
No. 1 cast, Ch'go (net ton)	12.50	12.50	12.50	12.50

Coke, Connellsville

Per Net Ton at Oven:	Jan. 3, 1939	Dec. 27, 1938	Dec. 6, 1938	Jan. 4, *1938
Furnace coke, prompt	$3.75	$3.75	$3.75	$4.00
Foundry coke, prompt	4.75	4.75	4.75	5.00

Non-Ferrous Metals

Cents per Lb. to Large Buyers:	Jan. 3, 1939	Dec. 27, 1938	Dec. 6, 1938	Jan. 4, *1938
Copper, Electrolytic, Conn.	11.25	11.25	11.25	10.125
Copper, Lake, New York	11.375	11.375	11.375	11.125
Tin (Straits), New York	**46.50**	46.375	46.25	....
Zinc, East St. Louis	4.50	4.50	4.50	5.00
Zinc, New York	4.89	4.89	4.89	5.35
Lead, St. Louis	4.70	4.70	4.70	4.60
Lead, New York	4.85	4.85	4.85	4.75
Antimony (Asiatic), N. Y.	14.00	14.00	14.00	15.00

On export business there are frequent variations from the above prices. Also in domestic business, there is at times a range of prices on various products, as shown in our detailed price tables.

The Iron Age Composite Prices

	Finished Steel	Pig Iron	Steel Scrap
January 3, 1939	2.286 a Lb.	$20.61 a Gross Ton	$14.92 a Gross Ton
One week ago	2.286	20.61	14.92
One month ago	2.286	20.61	14.75
One year ago	2.512c.	23.25	14.00

Based on steel bars, beams, tank plates, wire, rails, black pipe, sheets and hot-rolled strip. These products represent 85 per cent of the United States output.

Based on average basic iron at Valley furnace and foundry irons at Chicago, Philadelphia, Buffalo, Valley and Southern iron at Cincinnati.

Based on No. 1 heavy melting steel quotations at Pittsburgh, Philadelphia and Chicago.

	Finished Steel High	Finished Steel Low	Pig Iron High	Pig Iron Low	Steel Scrap High	Steel Scrap Low
1938	2.512c., May 17	2.211c., Oct. 18	$23.25, June 21	$19.61, July 6	$15.00, Nov. 22	$11.00, June 7
1937	2.512c., Mar. 9	2.249c., Jan. 4	23.25, Mar. 9	20.25, Feb. 16	21.92, Mar. 30	12.92, Nov. 16
1936	2.249c., Dec. 28	2.016c., Mar. 10	19.73, Nov. 24	18.73, Aug. 11	17.75, Dec. 21	12.67, June 9
1935	2.062c., Oct. 1	2.056c., Jan. 8	18.84, Nov. 5	17.83, May 14	13.42, Dec. 10	10.33, Apr. 23
1934	2.118c., Apr. 24	1.945c., Jan. 2	17.90, May 1	16.90, Jan. 27	13.00, Mar. 13	9.50, Sept. 25
1933	1.953c., Oct. 3	1.792c., May 2	16.90, Dec. 5	13.56, Jan. 3	12.25, Aug. 8	6.75, Jan. 3
1932	1.915c., Sept. 6	1.870c., Mar. 15	14.81, Jan. 5	13.56, Dec. 6	8.50, Jan. 12	6.43, July 5
1931	1.981c., Jan. 13	1.883c., Dec. 29	15.90, Jan. 6	14.79, Dec. 15	11.33, Jan. 6	8.50, Dec. 29
1930	2.192c., Jan. 7	1.962c., Dec. 9	18.21, Jan. 7	15.90, Dec. 16	15.00, Feb. 18	11.25, Dec. 9
1929	2.223c., Apr. 2	2.192c., Oct. 29	18.71, May 14	18.21, Dec. 17	17.58, Jan. 29	14.08, Dec. 3
1928	2.192c., Dec. 11	2.142c., July 10	18.59, Nov. 27	17.04, July 24	16.50, Dec. 31	13.08, July 2
1927	2.402c., Jan. 4	2.212c., Nov. 1	19.71, Jan. 4	17.54, Nov. 1	15.25, Jan. 17	13.08, Nov. 22

. . . SUMMARY OF THE WEEK . . .

. . . Ingot production rebounds to 52 per cent of capacity.

o o o

. . . Railroad orders and inquiries offer encouraging prospect.

o o o

. . . Pig iron output lost 6.1 per cent in December.

STEEL ingot production, recovering from the holiday week curtailments, starts out the new year at about 52 per cent of the industry's capacity, or approximately double the rate of the first week of 1938. A slowly advancing trend is indicated for the remainder of this month.

Striking gains in operations have taken place in some districts. At Pittsburgh the rate has risen 17 points to 45 per cent, the Wheeling-Weirton district has gained 15 points to 77 per cent, the Youngstown average is also up 15 points to 47 per cent, the Cleveland-Lorain district has recovered 11 points to 45 per cent, and the Chicago district is up 4½ points to 52½ per cent. The only loss is at Detroit, where the Great Lakes Steel Corp. has taken off two open-hearth furnaces for repairs, making the rate there 84 per cent.

While December bookings by many of the steel companies were 15 to 20 per cent below those of November, a good deal of the business placed during the past two or three weeks was scheduled for shipment after the first of the year, which, with fairly good backlogs of construction steel and railroad orders, accounts for this week's fairly satisfactory rate.

Considering the usual holiday influence on business, the volume of orders received by the mills during the past week was encouraging. Demand has been fairly good from a wide range of consumers, in addition to a flow of specifications for steel to be used for building construction and railroad maintenance.

RAILROAD and construction orders were conspicuous as the year began. The Northern Pacific placed 30,000 tons of rails, of which 20,000 tons will be furnished by Carnegie-Illinois, 9000 by Bethlehem, 500 by Inland and 500 by Colorado Fuel & Iron. The Great Northern will buy 12 diesel-electric switching locomotives; the Norfolk & Western will build ten freight engines in its own shops; the Lehigh & New England is inquiring for 100 hopper cars; the Union Pacific will spend $1,480,000 to modernize passenger cars; the Atchison, Topeka & Santa Fe, which ordered 30 locomotives last week, will spend $3,500,000 additional this year on car and locomotive repairs; the Delaware, Lackawanna & Western will build 200 freight cars, for which material has just been ordered, and the Wheeling & Lake Erie has allocated the steel for 400 freight cars recently ordered. The Chesapeake & Ohio has bought track accessories to go with the 25,000 tons of rails it recently ordered. The two Canadian roads will spend upward of $30,000,000 for new equipment, the Canadian National having already put out inquiries for 2000 box cars and other equipment.

This small spurt in railroad buying is only a sample of the replenishments that the railroads will find it necessary to make in 1939. The solvent roads, whose earnings have lately been increasing, may soon be in a position to make larger expenditures without Federal aid.

Structural steel lettings totaled about 36,000 tons, of which 16,000 tons for transmission towers at Los Angeles went to Bethlehem Steel Co. Other large awards were 5100 tons for a machine shop at the Mare Island navy yard, 1800 tons for an infirmary at Kings Park, N. Y., and 1200 tons for a caisson gate at Bremerton, Wash. New projects of only 8700 tons include 2500 tons for an apartment building in Philadelphia and 1500 tons for a hospital building in Jersey City.

The situation in flat rolled steels is much better than was expected in view of the heavy buying of last October. Some of the mills enter the new year with bookings of three to six weeks on hot rolled sheets and four to eight weeks on cold rolled sheets. Unless there is an unexpected decline in automobile assemblies, substantial tonnages will be placed by some of the motor car companies before the end of the month. The Chinese trade commission in this country placed orders for $2,000,000 worth of commercial trucks with General Motors and Chrysler.

PIG iron production in December totaled 2,201,627 gross tons compared with 2,269,983 tons in November. The December daily rate was 71,020 tons against 75,666 tons in November, a loss of 6.1 per cent. On Jan. 1 there were 116 furnaces in blast, net loss of five from the 121 that were active on Dec. 1. The U. S. Steel Corp. put out two, the independents put out four but added two, a net loss of two, and two merchant furnaces discontinued operations and one went in. The 1938 pig iron total was 18,773,135 tons, a loss of 48.7 per cent from the 36,611,317 tons produced in 1937. The year starts with the addition of a new furnace, the Inland Steel Co. having blown in its recently completed 1000-ton stack, which brings the number of potentially active furnaces in the United States to 239.

Production of open-hearth and Bessemer steel ingots in 1938 is estimated at about 28,000,000 tons. Electric steel output probably was around 500,000 tons, official figures not yet being available.

Scrap prices started the new year with no important changes. THE IRON AGE scrap composite price remains at $14.92.

. . Industry Speaks in Brief of 1939 . .

CHARLES J. HARDY, *president, American Car & Foundry Co.*—"The New Year sees the railroads at the threshold of what may be, for them, a new era—one of restored prosperity with its concomitant of a vast increase in their capacity for service, an increase which will be of incalculable benefit to our country and our people."

WILLIAM P. WITHEROW, *president, Blaw-Knox Co.*—"One of the most heartening signs for the new year is the evidence that industry in the United States is at last developing a voice and beginning to compete in a broader way for public understanding and good-will."

GEORGE H. BUCHER, *president, Westinghouse Electric & Mfg. Co.*—"If general business becomes better during 1939, the electrical industry is in excellent position to measure up to its opportunities. The possibilities of electricity as a servant of industry are only beginning to be realized."

ALFRED P. SLOAN, *chairman, General Motors Corp.*—"There undoubtedly exist the essential fundamentals of a broad recovery that might well be sustained. This appears to depend more upon political developments here and abroad as affecting the economy of the various nations than upon the existing economic possibilities."

W. J. AUSTIN, *president, The Austin Co.*—"Recent developments have piled higher and higher premiums on plant efficiency and economic distribution facilities. Projected developments which should materialize within the next eight months will see the introduction of mechanical handling facilities in many unusual ways."

GERARD SWOPE, *president, General Electric Co.*—"General Electric Co. is looking forward with confidence to a better year in 1939 than in 1938. Factors which should create increased opportunities for production of heavier capital goods are . . . closer cooperation of labor, industry and government, the ever-increasing use of electricity, the great need for electric appliances in the home, and the demand for more power in factories."

GEORGE J. STANLEY, *vice-president, Aluminum Co. of America*—"With unfilled orders in the automotive industry increasing each week, automobile production in 1939 should far exceed the previous year's output. The various aluminum fabricators, in turn, may expect better demand for pistons, cylinder heads and other automobile parts."

W. S. FARISH, *president, Standard Oil Co. of N. J.*—"The outlook for 1939 permits a hopeful, if not an optimistic, attitude. It is reasonable to expect a modest increase in domestic demand. Exports may fall off but they should still afford a sizable outlet. Fundamentally, the industry is close to a sound position."

DONALD L. BROWN, *president, United Aircraft Corp.*—"No thinking person questions the fact that the future course of world affairs will be strongly influenced by the development of that most important auxiliary of national defense, commercial aviation."

WENDELL E. WHIPP, *president, National Machine Tool Builders' Association*—"Machine tool builders greet the new year in a spirit of moderate optimism. While new products and new ventures always result in a certain amount of machine tool business, the major market for the country will doubtless continue to be in replacement of obsolete and outworn equipment in established industries. Machine tool equipment in American industries has been permitted to become 60 per cent obsolete."

MEETINGS

Jan. 9 to 13—Society of Automotive Engineers, Detroit.

Jan. 10 to 12—Institute of Scrap Iron and Steel, St. Louis.

Feb. 9 to 11—Conference of iron, steel and allied industries, Del Monte, Cal.

Feb. 14 to 17—Purchasing Agents Association, Indianapolis.

April 26 to 29—Electrochemical Society, Columbus, Ohio.

DAVID M. GOODRICH, *chairman, B. F. Goodrich Co.*—"Discoveries of these new (synthetic) materials are expanding tremendously the current field of operations available to rubber manufacturers. In certain respects, and for specific purposes, properties of some of these materials excel even those of natural rubber."

CHARLES R. HOOK, *president, American Rolling Mill Co.*—"With the coming of a new year, it is well for all of us to renew our pledge for American industry to adopt and maintain high ethical standards in all its operations."

THOMAS J. WATSON, *president, International Business Machines Corp.*—"The world requires a large increase in international trade to maintain reasonable standards of living and to reduce the economic pressure which is the cause of war. The stimulation to international commerce which the reciprocal trade treaty program may be expected to provide is therefore a greatly needed one."

H. GERRISH SMITH, *president, National Council of American Shipbuilders*—"With construction of vessels for commercial use, together with building for the Navy Department and other branches of the Government, and with the construction of a large number of miscellaneous craft, the shipbuilding industry in the United States is now more active than at any time since the World War period."

J. J. PELLEY, *president, Association of American Railroads*—"The association estimates that if their financial condition would permit the railroads of the United States could profitably install 100,000 new freight cars and 2000 new locomotives annually in the next five years."

MAJ. GEN. JAMES G. HARBORD, *Chairman, Radio Corp.*—"There are many things in America that need improvement but our troubles are much less than those which beset almost every other country in the world, and our natural advantages are so much greater that we may well thank God that we are not as other men."

WHITNEY CHAINS

Serve Every Industry...

In machinery, metal working, oil, lumber, textile—process and food—and automotive industries—all over the industrial map, Whitney chains carry heavy responsibilities. Check with machine designers, builders, users. You'll find that Whitney chains have what it takes for all types of power transmission and materials handling services—that the name Whitney carries weight. Bring your chain drive problems to Whitney.

The Whitney Chain & Mfg. Co., Hartford, Conn.

FABRICATED STEEL

NORTH ATLANTIC STATES
AWARDS

1800 Tons, Kings Park, N. Y., infirmary building, to American Bridge Co., Pittsburgh.
930 Tons, New York, Family Court Building, to Harris Structural Steel Co., Plainfield, N. J.
625 Tons, Stapleton, N. Y., extension, Marine Hospital, to Bethlehem Fabricators, Inc., Bethlehem, Pa.
580 Tons, Baltimore, laboratory building, University of Maryland, to Bethlehem Fabricators, Inc., Bethlehem, Pa.
500 Tons, New York, Macombs Dam bridge over Harlem River, to American Bridge Co., Pittsburgh.
480 Tons, Cape May County bridge, to Bethlehem Steel Co. (additional tonnage).
475 Tons, Plainfield, Conn., bridge, to American Bridge Co., Pittsburgh.
475 Tons, Dannemora, N. Y., hospital, to Bethlehem Steel Co., Bethlehem, Pa.
440 Tons, Wilkinsburg, Pa., municipal building, to Fort Pitt Bridge Works Co., Pittsburgh.
365 Tons, New York, addition to public school No. 142, to Lehigh Structural Steel Co., Allentown, Pa.
360 Tons, Southbury, Conn., State Hospital buildings, to Bethlehem Fabricators, Inc., Bethlehem, Pa.
230 Tons, New York, curbing for city, to American Bridge Co., Pittsburgh.
225 Tons, Norwich-Sprague, Conn., Shetucket River bridge, to American Bridge Co., Pittsburgh.
190 Tons, Roxbury, N. Y., grade and high school, to Bethlehem Steel Co., Bethlehem, Pa.
190 Tons, New York, seaplane ramp, North Beach Airport, to American Bridge Co., Pittsburgh.
175 Tons, Pittsburgh, Plum Township, Pa., high school, to Independent Steel Co., Pittsburgh.
165 Tons, Braddock, Pa., Junior High School, to American Bridge Co., Pittsburgh.
160 Tons, Southbury, Conn., Pomerang River bridge, to American Bridge Co., Pittsburgh.
120 Tons, Hazleton, high school grandstand, to Pittsburgh-Des Moines Steel Co., Pittsburgh.
115 Tons, Plymouth-Milford-Tilton, N. H., three schools to Lyons Iron Works, Inc., Manchester, N. H.; C. H. Cunningham & Co., Lynn, Mass., contractors.

THE SOUTH

285 Tons, Dewitt and Goliad Counties, Tex., Fap-1014 A, to North Texas Iron & Steel Co., Fort Worth, Tex.
170 Tons, Borden County, Tex., Fap-1018 A, to Central Texas Iron Works Co., Abilene, Tex.
125 Tons, Callahan County, Tex., bridge, to Central Texas Iron Works, Abilene, Tex.
100 Tons, Frio County, Tex., bridge, to Alamo Iron Works, San Antonio, Tex.

CENTRAL STATES

920 Tons, Sparta, Wis., bridge, to Milwaukee Bridge Co., Milwaukee.
650 Tons, Ecorse, Mich., grade separation bridges, to American Bridge Co., Pittsburgh.
575 Tons, Des Moines, Iowa, State bridge over Des Moines River, to Pittsburgh-Des Moines Steel Co., Pittsburgh.
270 Tons, Terre Haute, Ind., penitentiary, to Bethlehem Steel Co., Bethlehem, Pa.
260 Tons, Cleveland, cellars, Standard Brewing Co., to Republic Structural Steel Co.
245 Tons, Bloomington, Ohio, women's dormitories, erroneously reported as awarded to Central States Bridge & Structural Co., Indianapolis, in issue of Dec. 29.
180 Tons, Lafayette, Ind., men's dormitory, Purdue University, to Indiana Bridge Co., Muncie, Ind., through George A. Fuller.
135 Tons, Oconto, Wis., beams, plain and fabricated, to Carnegie-Illinois Steel Co., Pittsburgh.
112 Tons, Madison, Wis., building for Great Lakes Naval Training Station, to Gage Structural Steel Co., Chicago.

WESTERN STATES

16,000 Tons, Los Angeles, transmission towers for Department of Water and Power, to Bethlehem Steel Co., Los Angeles.
5100 Tons, Mare Island, Cal., Navy Yard machine shop, to American Bridge Co.
1200 Tons, Bremerton, Wash., caisson gate, to Winslow Marine Railway & Shipbuilding Co., Seattle.
400 Tons, Logan, Utah, field house, Utah State Agriculture College, to Bethlehem Steel Co.
265 Tons, Honolulu, warehouse extension, Terminal Building, to Honolulu Iron Works Co.
250 Tons, Zane, Idaho, three bridges, to Stupp Brothers Bridge & Iron Co.
170 Tons, Los Angeles, Verdugo Wash bridge for United States Engineer, to Bethlehem Steel Co., Los Angeles.
170 Tons, Los Angeles, San Fernando Road bridge for United States Engineer, to Bethlehem Steel Co., Los Angeles.
125 Tons, Klamath Falls, Ore., State undercrossing, to Poole & McGonigle, Portland, Ore.

PENDING STRUCTURAL PROJECTS

NORTH ATLANTIC STATES

2500 Tons, Philadelphia, apartment house, J. J. & R. Greenberg, Inc.
1500 Tons, Jersey City, N. J., hospital.
500 Tons, Queens, N. Y., highway bridge.
350 Tons, Brighton, N. Y., school.
310 Tons, Clifton, N. J., State underpass.
300 Tons, Brooklyn, Schaefer Brewing Co. building.
235 Tons, Rockaway Beach, N. Y., concessions buildings.
200 Tons, Washington, key bridge addition.
200 Tons, Lawrence, Mass., three bridges.
175 Tons, New York, retail market.

THE SOUTH

200 Tons, Birmingham, sintering plant.

CENTRAL STATES

712 Tons, Wyandotte, Kan., highway bridge, J. A. Tobin Construction Co., Kansas City, Mo., general contractor.
342 Tons, Morton County, Kan., highway bridge, Geiger & Weatherford, Leavenworth, Kan., general contractor (previously reported).
300 Tons, Minneapolis, women's dormitory, University of Minnesota.
250 Tons, Columbus, Ohio, service building, F. & R. Lazarus & Co.
225 Tons, Newberry, Mich., State hospital buildings.
200 Tons, Cleveland, Veterans' Hospital at Blossom Hill; Lundoff-Bicknell Co., general contractor.
183 Tons, Sedgwick County, Kan., highway bridge, Rhodes Construction Co., general contractor.
125 Tons, Milwaukee, Woolworth store.

WESTERN STATES

196 Tons, Lassen National Forest, Cal., bridges for Bureau of Public Roads; bids Jan. 17.
Unstated Tonnage, Mare Island, Cal., and Bremerton, Wash., two 50-ton cranes for Navy; bids Jan. 25.

FABRICATED PLATES

AWARDS

475 Tons, Crownover, Wash., roller gates for Roza Dam (Specification 810), to Treadwell Construction Co., Midland, Pa.

PENDING PROJECTS

2523 Tons, Los Angeles, aqueduct laterals for Metropolitan Water District; Western Pipe & Steel Co. of California, Los Angeles, low on steel alternate, but concrete pipe slightly lower on portion project.

REINFORCING STEEL

. . . Awards of 1400 tons—7150 tons in new projects.

AWARDS
ATLANTIC STATES

253 Tons, Cumberland County, Pa., Pennsylvania Turnpike Commission, sections 11 and 12, Girard Construction Co., Philadelphia, contractor, to Bethlehem Steel Co., Bethlehem, Pa.
200 Tons, Franklin, N. H., three schools to Bethlehem Steel Co. and Joseph T. Ryerson & Son, Inc., Cambridge, Mass.
150 Tons, Cambridge, Mass., to city incinerator, to Truscon Steel Co., Boston.
140 Tons, Brockton, N. Y., school, to Truscon Steel Co., Youngstown.
125 Tons, Annapolis, Md., laundry building, Naval Academy, to Bethlehem Steel Co., Bethlehem, Pa., through Lange Bros., Baltimore, contractors.
105 Tons, Norwich, Conn., infirmary, split two ways.
100 Tons, Pittsburgh, Leechburg Road, to Bethlehem Steel Co., Bethlehem, Pa.; through L. A. Davidson, Lansing, Mich., contractor.

CENTRAL AND WESTERN STATES

160 Tons, Ecorse, Mich., grade separation, outer drive, to Truscon Steel Co., Youngstown; through W. J. Storen Co., Detroit, contractor.
133 Tons, Sonora, Cal., auditorium and science building, to Klinger Co., Stockton, Cal.

PENDING REINFORCING BAR PROJECTS

ATLANTIC STATES

500 Tons, Baltimore, officers' quarters and field office, Holabird QMD; Consolidated Engineering Co., Baltimore, low bidder (previously reported).
150 Tons, Everett, Mass., Metropolitan sewer, section 104.
125 Tons, Charles City, Va., Chickahoming River bridge.

CENTRAL AND WESTERN STATES

3240 Tons, Bonneville, Ore., power house; L. H. Hoffman, Portland, general contractor.
700 Tons, Chanute Field, Ill., barracks.
525 Tons, Steubenville, Ohio, high school.
500 Tons, Cleveland, Veterans' Hospital at Blossom Hill; general contract to Lundoff-Bicknell Co. (previously reported).
434 Tons, Delta, Cal., Central Valley project (Invitation 33056-A); bids in.
275 Tons, Minneapolis, Minn., women's dormitory.
275 Tons, Wadsworth, Kan., incinerator building.
250 Tons, Madison, Wis., Washington grade school.
247 Tons, Berkeley, Cal., press building; Dinwiddie Co., general contractor.
200 Tons, Cleveland, supplementary approach to Main Street viaduct.
190 Tons, Billings, Mont., health service building.
180 Tons, Cleveland, east approach to Main Street bridge; Lombardo Bros., low bidder (previously reported).
150 Tons, Marinette, Wis., hospital.
149 Tons, San Leandro, Cal., sewage disposal plant; new bids Jan. 16.
113 Tons, Lassen National Forest, Cal., bridges for Bureau of Public Roads; bids Jan. 17.
110 Tons, San Francisco, St. Emydius school; bids in.
Unstated tonnage, Schofield barracks, Hawaii; bids Jan. 10.

Lamson & Sessions Dissolves Subsidiaries

CLEVELAND—Lamson & Sessions Co., bolt and nut manufacturer with headquarters here, is simplifying its corporate structure by dissolving two wholly owned subsidiaries, Lamson & Sessions Bolt Co. of Chicago, and Birmingham respectively. Exactly as before, sales and manufacturing will be independently managed as separate divisions by W. M. Olsen as general manager at Chicago and George S. Case, Jr., as general manager at Birmingham.

Great Britain is Optimistic for 1939

LONDON, Jan. 3 (*By Cable*)—The year opens here with optimism. Expansion of iron and steel business is envisaged as producers are no longer weighted with heavy stocks. So far, however, consumers have shown no hurry to commit themselves at the new (lower) prices which went into effect the first of the year.

Two blast furnaces have restarted, one on Cleveland foundry iron. North East Coast production estimates reveal decreases in 1938 of 24 per cent in pig iron and 19 per cent in steel below 1937. Steel production is likely to increase as the Government is to furnish the population with 20,000,000 small air raid shelters, mainly in arch form of corrugated sheets.

Tin plate business is quiet as works were closed last week for the holidays. Unfilled orders are 2,000,000 base boxes, but deliveries are spread over a considerable period. Mills need orders for nearby rolling. All export orders are now at c. i. f. rates based on 20s. 3d., IC, f. o. b. There is talk of this price being advanced at the next Cartel meeting but some American opposition is possible

Cartel price discussions will take place at a London meeting early this month.

Commerce Department Statistics Separated

WASHINGTON — Announcement has been made by the Department of Commerce that as the result of recomendations by a committee appointed by former Secretary Roper to consider possible improvements in the current business statistical services of the department the Bureau of the Census will now be responsible for the collection, tabulation and release of the basic tables on current statistics of retail and wholesale trade and manufacturing, while the Bureau of Foreign and Domestic Commerce will analyze, interpret and publish the final reports. Previously, each of the bureaus performed both functions in certain fields.

The new arrangement applies only to business and industrial statistics gathered at intervals under one year and does not affect the periodic industrial and business censuses. Special studies conducted by either bureau do not come within the scope of the policy change.

NLRB Certifies CIO at Westinghouse Plant

WASHINGTON—The National Labor Relations Board has certificated the United Electrical, Radio and Machine Workers of America, Local 1105 (CIO) as the sole collective bargaining agency for production, maintenance, and service employees of Westinghouse Electric & Mfg. Co., Chicago service branch, Chicago.

The board has issued an order and stipulation requiring the Hatfield Wire & Cable Co., Hillside, N. J., to offer to reinstate 87 employees and to pay by check $15,000 to the board's regional director for the second region, for distribution to the employees involved, in full settlement of all claims for back pay arising out of employee complaints against the company. The company also agreed to bargain collectively with the United Electrical, Radio and Machine Workers, Local No. 403.

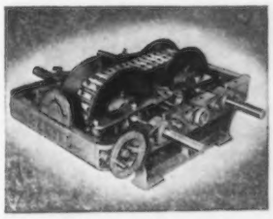
WHO IS THE "BOSS" the MAN, or the MACHINE?

● In thousands of industrial plants certain machines stubbornly refuse to do things except in their own way—at their own pace.

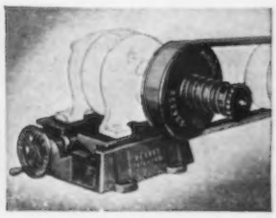
They have one set speed, and they stick to it—through thick and thin!

Alongside these machines are others, equipped with REEVES Variable Speed Control. *They* respond to every demand for change of pace to meet changing conditions and materials, to process or manufacture different sizes and shapes of products, to match the operator's skill, to keep "in step" with other machines in the production line. The operator merely turns the REEVES handwheel to get any speed he needs—even to a fraction of a revolution—and that exact speed is maintained as long as he desires.

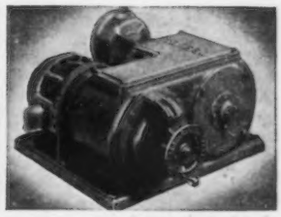
There is no question which of these machines is the more profitable. REEVES Variable Speed Control makes any production machine a better investment. Why not let the REEVES representative in your territory look over the machines in *your* plant, and make recommendations? No obligation. Write us today. REEVES PULLEY COMPANY, Dept. I-19, Columbus, Indiana.



VARIABLE SPEED TRANSMISSION. Provides infinite speed adjustability over wide range. Accurate and positive at all speeds. Modern, compact open and enclosed designs, vertical and horizontal. Fifteen sizes—fractional to 100 h. p. Speed variations from 2:1 to 16:1 inclusive.



VARI-SPEED MOTOR PULLEY. Simplified development of Transmission. Mounts on standard shaft of any constant speed motor. Forms direct drive to machine. Sliding motor base is moved forward or back for speed changes. Seven sizes—fractional to 7½ h. p., 3:1 range of variation.



VARI-SPEED MOTODRIVE. Combines in one compact, self-contained enclosure, constant speed motor, REEVES speed varying mechanism and reduction gears (where required). Available in space-saving horizontal and vertical types—¼ to 10 h. p. Speed variations 2:1 to 6:1 inclusive.

REEVES SPEED CONTROL

. . . NON-FERROUS . . .

THE holiday week brought no noticeable change in the position of the domestic copper market. Sales were at a very low level, between 250 and 600 tons a day, and producers' quotations on electrolytic material remained at 11.25c. per lb., Connecticut Valley. There did appear, however, a faint suggestion of better sentiment in the improvement in prices in the open market. Sellers in that market were asking 10.60c. per lb. on Friday as against 10.50c. two weeks ago. Export buying continues to follow an erratic course with no definite trend in evidence.

Lead

Heavy buying by most of the important consumers gave lead sellers the third consecutive week of excellent sales. On several days during the past week, bookings were in excess of intake. While some February business has been booked, the bulk of the week's business was for January. The domestic price remains at 4.70c. per lb., St. Louis, but in view of the present strong market it appears that the only factor preventing a rise from this level is the failure of the London price to respond to the better sentiment here.

Zinc

The market was moderately active during the short holiday week, with sales estimated to have been in the neighborhood of 3500 tons. While this figure is below that of the previous full week, it is substantially above those of the past five weeks, or since price was cut from 5.05c. per lb. Domestic prices are firm at 4.50c. per lb., East St. Louis, while the London price eased to 2.83c. on Tuesday from 2.91c. on Friday.

Tin

Supported primarily by purchases of tin plate makers, business in the past week was notably better than in the preceding week, in face of an anticipated year-end dullness. The improved volume of sales, the bulk of which was for first quarter delivery, moved Straits up to a high of 46.75c., New York, on Thursday. On Tuesday a lull in buying caused prices to drop back to 46.50c., but sellers attach no significance to this as present indications are that substantial tonnages must yet be bought before tin plate makers will be covered adequately on the first six months' needs.

NON-FERROUS PRICES

Cents per lb. for early delivery

	Dec. 28	Dec. 29	Dec. 30	Dec. 31	Jan. 3
Copper, Electrolytic[1]	11.25	11.25	11.25	11.25	11.25
Copper, Lake	11.375	11.375	11.375	11.375	11.375
*Tin, Straits, New York	46.50	46.75	46.65	....	46.50
Zinc, East St. Louis[2]	4.50	4.50	4.50	4.50	4.50
Lead, St. Louis[3]	4.70	4.70	4.70	4.70	4.70

[1] Delivered Conn. Valley, deduct ¼c. for New York delivery. [2] Add 0.39c. for New York delivery. [3] Add 0.15c. for New York delivery.

*Dec. 27 quotation corrected to 46.375c.

Warehouse Prices

Base per lb., Delivered

	New York	Cleveland
Tin, Straits pig	47.50c.	49.75c.
Copper, lake	12.25c.	12.375c.
Copper, electro	11.50c.	12.375c.
Copper, castings	11.25c.	11.875c.
*Copper sheets, hot-rolled	19.375c.	19.375c.
*High brass sheets	17.31c.	17.31c.
*Seamless brass tubes	20.06c.	20.06c.
*Seamless copper tubes	19.875c.	19.875c.
*Brass rods	12.62c.	12.62c.
Zinc slabs	6.25c.	7.25c.
Zinc sheets, No. 9 casks	10.50c.	12.10c.
Lead, American pig	5.60c.	5.60c.
Lead, bar	6.275c.	8.50c.
Lead, sheets, cut	8.00c.	8.00c.
Antimony, Asiatic	15.00c.	17.75c.
Alum., virgin, 99 per cent plus	22.50c.	22.50c.
Alum., No. 1 remelt., 98 to 99 per cent	19.50c.	19.50c.
Solder, ½ and ½	28.80c.	29.10c.
Babbitt metal, commercial grade	22.75c.	22.50c.

*** These prices, which are also for delivery from Chicago warehouses, are quoted with the following percentages allowed off for extras: on copper sheets, 33 1/3; on brass sheets and rods, 40, and on brass and copper tubes, 25.**

Old Metals Per Lb., New York

Buying prices are paid by dealers for miscellaneous lots from smaller accumulators. Selling prices are those charged to consumers after the metal has been prepared for their uses.

	Dealers' Buying Prices	Dealers' Selling Prices
Copper, hvy. crucible	8.00c.	8.75c.
Copper, hvy. and wire	7.00c.	7.50c.
Copper, light and bottoms	6.25c.	6.50c.
Brass, heavy	4.25c.	4.75c.
Brass, light	3.375c.	4.125c.
Hvy. machine composition	6.125c.	7.625c.
No. 1 yel. brass turnings	4.125c.	4.625c.
No. 1 red brass or compos. turnings	5.875c.	6.50c.
Lead, heavy	3.625c.	4.50c.
Cast aluminum	7.00c.	8.25c.
Sheet aluminum	11.75c.	13.25c.
Zinc	2.25c.	3.50c.

Miscellaneous Non-Ferrous Prices

ALUMINUM, delivered; virgin 99 per cent plus, 20c.-21c. a lb.; No. 12 remelt, No. 2 standard, 19c.-19.50c. a lb. NICKEL, electrolytic, 35c.-36c. a lb. base refinery, lots of 2 tons or more. ANTIMONY, prompt, New York; Asiatic, 14c. a lb., f.o.b.; American, 11.25c. a lb. QUICKSILVER, $77 per flask of 76 lb. BRASS INGOTS, commercial 85-5-5-5, 11c. a lb. lcl.

SCRAP SUMMARY

. . . Activity curtailed, but strength is indicated in most markets . . . Composite unchanged at $14.92.

JAN. 3.—Activity was at low ebb during the holiday week, but the market tone is strong in most trading centers. With a few minor exceptions, prices on practically all items are unchanged from last week, and for the fourth week the average price of No. 1 heavy melting steel remains at $14.92. Large tonnages of automotive scrap sold at Detroit last week were in line with currently published prices.

No new mill sales have been made in the Youngstown district, but brokers are short on commitments and are finding difficulty in bringing in material from outside areas. Similarly, scrap cannot be brought into the Cleveland district at the present published prices. Quoted prices are low, but unchanged in the absence of new mill sales. At St. Louis, in anticipation of a sale to an East Side mill, the scrap iron market is stronger, with dealers offering 50c. a ton higher for some items. Buying price on No. 1 steel is 25c. a ton lower, however.

Export buying prices are unchanged at the three Atlantic ports, although Boston brokers are paying the higher prices of the range more often than not.

Iron and Steel Scrap Prices

PITTSBURGH

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel	$15.50 to $16.00
Railroad hvy. mltng.	16.00 to 16.50
No. 2 hvy. mltng. steel	14.25 to 14.75
Scrap rails	16.50 to 17.00
Rails 3 ft. and under	17.00 to 17.50
Comp. sheet steel	15.50 to 16.00
Hand bundled sheets	14.50 to 15.00
Hvy. steel axle turn.	14.00 to 14.50
Machine shop turn.	9.75 to 10.25
Short shov. turn.	10.50 to 11.00
Mixed bor. & turn.	8.25 to 8.75
Cast iron borings	8.25 to 8.75
Cast iron carwheels	15.00 to 15.50
Hvy. breakable cast	12.50 to 13.00
No. 1 cupola cast	15.25 to 15.75
RR. knuckles & cplrs.	16.50 to 17.00
Rail coil & leaf springs	17.00 to 17.50
Rolled steel wheels	17.00 to 17.50
Low phos. billet crops	18.50 to 19.00
Low phos. punchings	17.00 to 17.50
Low phos. plate	16.75 to 17.25

PHILADELPHIA

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel	$15.00 to $15.50
No. 2 hvy. mltng. steel	13.50
Hydraulic bund., new	14.50 to 15.00
Hydraulic bund., old	11.50 to 12.00
Steel rails for rolling	17.00 to 17.50
Cast iron carwheels	16.50 to 17.00
Hvy. breakable cast	16.00
No. 1 cast	16.50 to 17.00
Stove plate (steel wks.)	13.00 to 13.50
Railroad malleable	15.50 to 16.00
Machine shop turn.	8.50 to 9.00
No. 1 blast furnace	6.50 to 7.00
Cast borings	6.50 to 7.00
Heavy axle turnings	10.00 to 10.50
No. 1 low phos. hvy.	16.50 to 17.00
Couplers & knuckles	16.50 to 17.00
Rolled steel wheels	16.50 to 17.00
Steel axles	21.50 to 22.00
Shafting	20.00 to 20.50
Spec. iron & steel pipe	12.00 to 12.50
No. 1 forge fire	11.00 to 11.50
Cast borings (chem.)	9.50 to 10.00

CHICAGO

Delivered to Chicago district consumers:

	Per Gross Ton
Hvy. mltng. steel	$13.50 to $14.00
Auto. hvy. mltng. steel alloy free	12.00 to 12.50
No. 2 auto. steel	11.50 to 12.00
Shoveling steel	13.50 to 14.00
Factory bundles	12.75 to 13.25
Dealers' bundles	12.00 to 12.50
Drop forge flashings	11.50 to 12.00
No. 1 busheling	12.00 to 12.50
No. 2 busheling, old	5.75 to 6.25
Rolled carwheels	15.25 to 15.75
Railroad tires, cut	16.25 to 16.75
Railroad leaf springs	15.75 to 16.25
Steel coup. & knuckles	15.25 to 15.75
Axle turnings	12.75 to 13.25
Coil springs	16.75 to 17.25
Axle turn. (elec.)	13.75 to 14.25
Low phos. punchings	15.75 to 16.25
Low phos. plates 12 in. and under	15.25 to 15.75
Cast iron borings	5.25 to 5.75
Short shov. turn.	7.00 to 7.50
Machine shop turn.	7.00 to 7.50
Rerolling rails	17.00 to 17.50
Steel rails under 3 ft.	15.75 to 16.25
Steel rails under 2 ft.	16.25 to 16.75
Angle bars, steel	15.25 to 15.75
Cast iron carwheels	12.25 to 12.75
Railroad malleable	14.75 to 15.25
Agric. malleable	11.25 to 11.75
	Per Net Ton
Iron car axles	19.50 to 20.00
Steel car axes	19.00 to 19.50
Locomotive tires	15.25 to 15.75
Pipes and flues	9.25 to 9.75
No. 1 machinery cast	12.25 to 12.75
Clean auto. cast	12.25 to 12.75
No. 1 railroad cast	11.25 to 11.75
No. 1 agric. cast	10.75 to 11.25
Stove plate	8.25 to 8.75
Grate bars	8.25 to 8.75
Brake shoes	9.25 to 9.75

YOUNGSTOWN

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel	$15.00 to $15.50
No. 2 hvy. mltng. steel	13.75 to 14.25
Low phos. plate	15.50 to 16.00
No. 1 busheling	13.50 to 14.00
Hydraulic bundles	14.25 to 14.75
Machine shop turn.	9.75 to 10.25

CLEVELAND

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel	$14.00 to $14.50
No. 2 hvy. mltng. steel	13.50 to 14.00
Comp. sheet steel	13.50 to 14.00
Light bund. stampings	11.00 to 11.50
Drop forge flashings	13.00 to 13.50
Machine shop turn.	7.00 to 7.50
Short shov. turn.	7.50 to 8.00
No. 1 busheling	13.00 to 13.50
Steel axle turnings	11.00 to 11.50
Low phos. billet and bloom crops	18.00 to 18.50
Cast iron borings	7.75 to 8.25
Mixed bor. & turn.	7.75 to 8.25
No. 2 busheling	7.75 to 8.25
No. 1 cast	16.50 to 17.00
Railroad grate bars	9.50 to 10.00
Stove plate	10.00 to 10.50
Rails under 3 ft.	19.00 to 19.50
Rails for rolling	17.00 to 17.50
Railroad malleable	15.50 to 16.00
Cast iron carwheels	14.00 to 14.50

BUFFALO

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel	$13.75 to $14.25
No. 2 hvy. mltng. steel	11.75 to 12.25
Scrap rails	15.00 to 15.50
New hvy. b'ndled sheets	11.75 to 12.25
Old hydraul. bundles	10.75 to 11.25
Drop forge flashings	11.75 to 12.25
No. 1 busheling	11.75 to 12.25
Hvy. axle turnings	10.50 to 11.00
Machine shop turn.	6.75 to 7.25
Knuckles & couplers	16.50 to 17.00
Coil & leaf springs	16.50 to 17.00
Rolled steel wheels	16.00 to 16.50
Low phos. billet crops	15.50 to 16.00
Shov. turnings	8.75 to 9.25
Mixed bor. & turn.	7.50 to 8.00
Cast iron borings	7.50 to 8.00
Steel car axles	16.50 to 17.00
No. 1 machinery cast	15.50 to 16.00
No. 1 cupola cast	14.50 to 15.00
Stove plate	13.00 to 13.50
Steel rails under 3 ft.	18.00 to 18.50
Cast iron carwheels	13.50 to 14.00
Railroad malleable	15.00 to 15.50
Chemical borings	9.00 to 9.50

ST. LOUIS

Dealers' buying prices per gross ton delivered to consumer:

Selected hvy. melting	$12.75 to $13.25
No. 1 hvy. melting	13.00 to 13.50
No. 2 hvy. melting	12.00 to 12.50
No. 1 locomotive tires	13.50 to 14.00
Misc. stand. sec. rails	14.50 to 15.00
Railroad springs	15.50 to 16.00
Bundled sheets	7.50 to 8.00
No. 1 busheling	7.50 to 8.00
Cast. bor. & turn.	3.50 to 4.00
Machine shop turn.	3.50 to 4.00
Heavy turnings	9.50 to 10.00
Rails for rolling	17.50 to 18.00
Steel car axles	18.50 to 19.00
No. 1 RR. wrought	10.50 to 11.00
No. 2 RR. wrought	12.50 to 13.00
Steel rails under 3 ft.	16.25 to 16.75
Steel angle bars	14.50 to 15.00
Cast iron carwheels	14.00 to 14.50
No. 1 machinery cast	15.00 to 15.50
Railroad malleable	12.00 to 12.50
No. 1 railroad cast	12.75 to 13.00
Stove plate	9.00 to 9.50
Grate bars	9.00 to 9.50
Brake shoes	10.75 to 11.25

CINCINNATI

Dealers' buying prices per gross ton at yards:

No. 1 hvy. mltng. steel	$11.50 to $12.00
No. 2 hvy. mltng. steel	9.25 to 9.75
Scrap rails for mltng.	15.25 to 15.75
Loose sheet clippings	6.75 to 7.25
Hydrau. b'ndled sheets	11.00 to 11.50
Cast iron borings	4.00 to 4.50
Machine shop turn.	5.25 to 5.75
No. 1 busheling	8.00 to 8.50
No. 2 busheling	2.75 to 3.25
Rails for rolling	17.50 to 18.00
No. 1 locomotive tires	14.25 to 14.75
Short rails	18.00 to 18.50
Cast iron carwheels	12.75 to 13.25
No. 1 machinery cast	13.50 to 14.00
No. 1 railroad cast	12.75 to 13.25
Burnt cast	6.75 to 7.25
Stove plate	6.75 to 7.25
Agricul. malleable	11.75 to 12.25
Railroad malleable	14.25 to 14.75
Mixed hvy. cast	10.50 to 11.00

BIRMINGHAM

Per gross ton delivered to consumer:

Hvy. melting steel	$12.50 to $14.00
Scrap steel rails	14.50 to 15.00
Short shov. turnings	7.50 to 8.10
Stove plate	9.00 to 10.00
Steel axles	15.00 to 16.00
Iron axles	15.00 to 16.00
No. 1 RR. wrought	10.00
Rails for rolling	16.00 to 16.50
No. 1 cast	14.50
Tramcar wheels	14.00

DETROIT

Dealers' buying prices per gross ton:

No. 1 hvy. mltng. industrial steel	$10.50 to $11.00
No. 2 hvy. mltng. steel	9.00 to 9.50
Borings and turnings	5.75 to 6.25
Long turnings	5.50 to 6.00
Short shov. turnings	6.00 to 6.50
No. 1 machinery cast	12.25 to 12.75
Automotive cast	13.50 to 14.00
Hvy. breakable cast	9.75 to 10.25
Hydraul. comp. sheets	11.75 to 12.25
Stove plate	8.00 to 8.50
New factory bushel	10.75 to 11.25
Sheet clippings	8.25 to 9.25
Flashings	9.00 to 9.50
Low phos. plate scrap	12.00 to 12.50

NEW YORK

Dealers' buying prices per gross ton on cars:

No. 1 hvy. mltng. steel	$10.50 to $11.00
No. 2 hvy. mltng. steel	9.00 to 9.50
Hvy. breakable cast	12.00 to 12.50
No. 1 machinery cast	11.50 to 12.00
No. 2 cast	9.50 to 10.00
Stove plate	9.50 to 10.00
Steel car axles	20.00 to 20.50
Shafting	15.50 to 16.00
No. 1 RR. wrought	11.00 to 11.50
No. 1 wrought long	9.50 to 10.00
Spec. iron & steel pipe	9.00 to 9.50
Rails for rolling	16.00 to 16.50
Clean steel turnings*	4.00 to 4.50
Cast borings*	3.50 to 4.00
No. 1 blast furnace	3.50 to 4.00
Cast borings (chem.)	9.50 to 10.00
Unprepared yard scrap	6.00 to 6.50
Light iron	3.00 to 3.50
Per gross ton, delivered local foundries:	
No. 1 machn. cast†	$13.50 to $14.00
No. 2 cast†	10.50 to 11.00

* $1.50 less for truck loads.
† Northern N. J. prices are $2 to $2.50 higher.

BOSTON

Dealers' buying prices per gross ton:

No. 1 hvy. mltng. steel	Nominal
Scrap rails	Nominal
No. 2 steel	Nominal
Breakable cast	$10.50 to $10.60
Machine shop turn.	3.38
Mixed bor. & turn.	2.00 to 2.25
Bun. skeleton long	8.15
Shafting	15.50 to 15.65
Cast bor. chemical	5.50 to 5.75
Per gross ton delivered consumers' yards:	
Textile cast	$13.50 to $15.00
No. 1 machine cast	13.50 to 15.00

PACIFIC COAST

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel	$12.50 to $14.00
No. 2 hvy. mltng. steel	11.50 to 13.00

CANADA

Dealers' buying prices at their yards, per gross ton:

	Toronto	Montreal
No. 1 hvy. mltng. steel	$11.00	$10.00
No. 2 hvy. mltng. steel	10.00	9.00
Mixed dealers steel	9.00	8.00
Scrap pipe	5.50	5.00
Steel turnings	4.50	4.00
Cast borings	4.00	3.50
Machinery cast	15.00	14.00
Dealers cast	13.00	12.00
Stove plate	10.00	9.00

EXPORT

Dealers' buying prices per gross ton:

New York, truck lots, delivered, barges	
No. 1 hvy. mltng. steel	$12.00 to $12.25
No. 2 hvy. mltng. steel	10.50 to 10.75
No. 2 cast	11.00
Stove plate	10.00
Boston on cars at Army Base or Mystic Wharf	
No. 1 hvy. mltng. steel	$13.50 to $14.00
No. 2 hvy. mltng. steel	12.50 to 13.00
Rails (scrap)	14.00
Philadelphia, delivered alongside boats, Port Richmond	
No. 1 hvy. mltng. steel	$14.50 to $15.00
No. 2 hvy. mltng. steel	13.50 to 14.00

PRICES ON FINISHED AND SEMI-FINISHED IRON AND STEEL

(Prices are f.o.b. unless otherwise indicated)

SEMI-FINISHED STEEL

Billets, Blooms and Slabs

Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham, Sparrows Point (Rerolling only). Prices delivered Detroit are $2 higher. F.o.b. Duluth, billets only, $2 higher.

	Per Gross Ton
Rerolling	$34.00
Forging quality	40.00

Sheet Bars

Pittsburgh, Chicago, Cleveland, Youngstown, Buffalo, Canton, Sparrows Point, Md.

	Per Gross Ton
Open-hearth or bessemer	$34.00

Skelp

Pittsburgh, Chicago, Youngstown, Coatesville, Pa., Sparrows Point, Md.

	Per Lb.
Grooved, universal and sheared	1.90c.

Wire Rods

(No. 5 to 9/32 in.)

	Per Gross Ton
Pittsburgh, Chicago or Cleveland	$43.00
Worcester, Mass.	45.00
Birmingham	43.00
San Francisco	52.00

Rods over 9/32 in. or 47/64 in., inclusive, $5 a ton over base.

SOFT STEEL BARS

	Base per Lb.
Pittsburgh, Chicago, Gary, Cleveland, Buffalo and Birmingham	2.25c.
Detroit, delivered	2.35c.
Duluth	2.35c.
Philadelphia delivered	2.57c.
New York	2.59c.
On cars dock Gulf ports	2.60c.
On cars dock Pacific ports	2.85c.

RAIL STEEL BARS

(For merchant trade)

Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Birmingham	2.10c.
On cars dock Tex. Gulf ports	2.45c.
On cars dock Pacific ports	2.70c.

BILLET STEEL REINFORCING BARS

(Straight lengths as quoted by distributers)

Pittsburgh, Chicago, Gary, Birmingham, Buffalo, Cleveland, Youngstown or Sparrows Pt.	1.90c. to 2.05c.
Detroit, delivered	2.00c. to 2.15c.
On cars dock Tex. Gulf ports	2.25c. to 2.40c.
On cars dock Pacific ports	2.50c.

RAIL STEEL REINFORCING BARS

(Straight lengths as quoted by distributers)

Pittsburgh, Chicago, Gary, Buffalo, Cleveland, Youngstown or Birmingham	1.75c. to 1.90c.
Detroit, delivered	1.85c. to 2.00c.
On cars dock Tex. Gulf ports	2.10c. to 2.25c.
On cars dock Pacific ports	2.35c.

Prices on reinforcing bars have been subject to concessions of $3 a ton or more from above quotations.

IRON BARS

Chicago and Terre Haute	2.15c.
Pittsburgh (refined)	3.60c.

COLD FINISHED BARS AND SHAFTING*

	Base per Lb.
Pittsburgh, Buffalo, Cleveland, Chicago and Gary	2.70c.
Detroit	2.75c.

* In quantities of 10,000 to 19,999 lb.

PLATES

	Base per Lb.
Pittsburgh, Chicago, Gary, Birmingham, Sparrows Point, Cleveland, Youngstown, Coatesville, Claymont, Del.	2.10c.
Philadelphia, del'd	2.15c.
New York, del'd	2.29c.
On cars dock Gulf ports	2.45c.
On cars dock Pacific ports	2.60c.
Wrought iron plates, P't'g	3.80c.

FLOOR PLATES

Pittsburgh or Chicago	3.35c.
New York, del'd	3.71c.
On cars dock Gulf ports	3.70c.
On cars dock Pacific ports	3.95c.

STRUCTURAL SHAPES

	Base per Lb.
Pittsburgh, Chicago, Gary, Buffalo, Bethlehem or Birmingham	2.10c.
Philadelphia, del'd	2.215c.
New York, del'd	2.27c.
On cars dock Gulf ports	2.45c.
On cars dock Pacific ports	2.70c.

STEEL SHEET PILING

	Base per Lb.
Pittsburgh, Chicago or Buffalo	2.40c.
On cars dock Gulf ports	2.85c.
On cars dock Pacific ports	2.90c.

RAILS AND TRACK SUPPLIES

F.o.b. Mill

Standard rails, heavier than 60 lb., per gross ton	$40.00
Angle bars, per 100 lb	2.70

F.o.b. Basing Points

Light rails (from billets) per gross ton	$40.00
Light rails (from rail steel) per gross ton	39.00

	Base per Lb.
Cut spikes	3.00c.
Screw spikes	4.55c.
Tie plates, steel	2.15c.
Tie plates, Pacific Coast ports	2.25c.
Track bolts, to steam railroads	4.15c.
Track bolts to jobbers, all sizes (per 100 counts)	65-5

Basing points on light rails are Pittsburgh, Chicago and Birmingham; on spikes and tie plates, Pittsburgh, Chicago, Portsmouth, Ohio, Weirton, W. Va., St. Louis, Kansas City, Minnequa, Colo., Birmingham and Pacific Coast ports; on tie plates alone, Steelton, Pa., Buffalo; on spikes alone, Youngstown, Lebanon, Pa., Richmond, Va.

SHEETS

Hot Rolled

	Base per Lb.
Pittsburgh, Gary, Birmingham, Buffalo, Sparrows Point, Cleveland, Youngstown, Middletown or Chicago	2.15c.
Detroit, delivered	2.25c.
Philadelphia, delivered	2.32c.
Granite City	2.25c.
On cars dock Pacific ports	2.65c.
Wrought iron, Pittsburgh	4.25c.

Cold Rolled*

Pittsburgh, Gary, Buffalo, Youngstown, Cleveland, Middletown or Chicago	3.20c.
Detroit, delivered	3.30c.
Granite City	3.30c.
Philadelphia, delivered	3.52c.
On cars dock Pacific ports	3.80c.

* Mill run sheets are 10c. per 100 lb. less than base; and primes only, 25c. above base.

Galvanized Sheets, 24 Gage

Pittsburgh, Chicago, Gary, Sparrows Point, Buffalo, Middletown, Youngstown or Birmingham	3.50c.
Philadelphia, delv'd	3.67c.
Granite City	3.60c.
On cars dock Pacific ports	4.00c.
Wrought iron Pittsburgh	6.10c.

Electrical Sheets

(*F.o.b. Pittsburgh*)

	Base per Lb
Field grade	3.20c.
Armature	3.55c.
Electrical	4.05c.
Special Motor	4.95c.
Special Dynamo	5.65c.
Transformer	6.15c.
Transformer Special	7.15c.
Transformer Extra Special	7.65c.

Silicon Strip in coils—Sheet price plus silicon sheet extra width extra plus 25c. per 100 lb. for coils. Pacific ports add 70c. a 100 lb

Long Ternes

No. 24 unassorted 8-lb. coating f.o.b. Pittsburgh or Gary	3.95c.
F.o.b. cars dock Pacific ports	4.65c.

Vitreous Enameling Stock, 20 Gage*

Pittsburgh, Chicago, Gary, Youngstown, Middletown or Cleveland	3.35c.
Detroit, delv'd	3.45c.
Granite City	3.45c.
On cars dock Pacific ports	3.95c.

TIN MILL PRODUCTS

***Tin Plate**

	Per Base Box
Standard cokes, Pittsburgh, Chicago and Gary	$5.00
Standard cokes, Granite City	5.10

* Prices effective Nov. 10 on shipments through first quarter of 1939.

Special Coated Manufacturing Ternes

	Per Base Box
Granite City	4.40
Pittsburgh or Gary	$4.30

Roofing Terne Plate

(*F.o.b. Pittsburgh*)

(Per Package, 112 sheets, 20 x 28 in.)

8-lb. coating I.C.	$12.00
15-lb. coating I.C.	14.00
20-lb. coating I.C.	15.00
25-lb. coating I.C.	16.00
30-lb. coating I.C.	17.25
40-lb. coating I.C.	19.50

Black Plate, 29 gage and lighter

Pittsburgh, Chicago and Gary	3.05c.
Granite City	3.15c.
On cars dock Pacific ports, boxed	4.00c.

HOT ROLLED STRIP

(*Widths up to 12 in.*)

	Base per Lb
Pittsburgh, Chicago, Gary, Cleveland, Middletown, Youngstown or Birmingham	2.15c.
Detroit, delivered	2.25c.

Cooperage Stock

Pittsburgh & Chicago	2.25c.

COLD ROLLED STRIP*

	Base per Lb
Pittsburgh, Youngstown or Cleveland	2.95c.
Chicago	3.05c.
Detroit, delivered	3.05c.
Worcester	3.15c.

* Carbon 0.25 and less.

Commodity Cold Rolled Strip

Pittsburgh, Youngstown, or Cleveland	3.10c.
Detroit, delivered	3.20c.
Worcester	3.50c.

COLD ROLLED SPRING STEEL

		Pittsburgh and Cleveland	Worcester
Carbon	0.26-0.50%	2.95c.	3.15c.
Carbon	.51 .75	4.30c.	4.50c.
Carbon	.76-1.00	6.15c.	6.35c.
Carbon	1.01 to 1.25	8.35c.	8.55c.

WIRE PRODUCTS

(Carload lots, f.o.b. Pittsburgh, Chicago, Cleveland and Birmingham)

To Manufacturing Trade

	Per Lb
Bright wire	2.60c.
Galvanized wire, base	2.65c.*
Spring wire	3.20c.

* On galvanizing wire to manufacturing trade, size and galvanizing extras are charged, the price Nos. 6 to 9 gage, inclusive, thus being 3.15c.

To the Trade

	Base per Keg
Standard wire nails	$2.45
Coated nails	2.45
Cut nails, carloads	3.60

	Base per 100 Lb.
Annealed fence wire	$2.95
Galvanized fence wire	3.35
Polished staples	3.15
Galvanized staples	3.40
Twisted barbless wire	3.20
Woven wire fence, base column	67
Single loop bale ties, base col...	56
Stand. 2 pt., 12.5 gage barbed cattle wire, per 80 rod spool	$2.54

Note: Birmingham base same on above items, except spring wire.

Add $4 a ton for Mobile, Ala.; $5 for New Orleans; $6 for Lake Charles to above bases, except on galvanized and annealed merchant fence wire, which are $1 a ton additional in ecah case.

STEEL AND WROUGHT IRON PIPE AND TUBING

Welded Pipe

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills

F.o.b. Pittsburgh only on wrought iron pipe.

Butt Weld

Steel			*Wrought Iron*		
In.	Black	Galv.	In.	Black	Galv.
⅛	56	36	¼ & ⅜	+9	+30
¼ to ⅜	59	43½	½	24	6½
½	63½	54	¾	30	13
¾	66½	58	1 & 1¼	34	19
1 to 3	68½	60½	1½	38	21½
			2	37½	21

Lap Weld

2	61	52½	2	30½	15
2½ & 3	64	55½	2½ to 3½	31½	17½
3½ to 6	66	57½	4	33½	21
7 & 8	65	55½	4½ to 8	32½	20
9 & 10	64½	55	9 to 12	28½	15
11 & 12	63½	54			

Butt weld, extra strong, plain ends

⅛	54½	41½	¼ & ⅜	+10	+43
½ to ⅜	56½	45½	½	25	9
½	61½	53½	¾	31	15
¾	65½	57½	1 to 2	38	22½
1 to 3	67	60			

Lap weld, extra strong, plain ends

2	59	51½	2	33½	18½
2½ & 3	63	55½	2½ to 4	39	25½
3½ to 6	66½	59	4½ to 6	37½	24
7 & 8	65½	56	7 & 8	38½	24½
9 & 10	64½	55	9 to 12	32	20½
11 & 12	63½	54			

On butt weld and lap weld steel pipe jobbers are granted a discount of 5%. On less-than-carload shipments prices are determined by adding 25 and 30% and the carload freight rate to the base card.

F.o.b. Gary prices are two points lower discount or $4 a ton higher than Pittsburgh or Lorain on lap weld and one point lower discount, or $2 a ton higher, on all butt weld 8 in. and smaller.

Boiler Tubes

Seamless Steel and Lap Weld Commercial Boiler Tubes and Locomotive Tubes. Minimum Wall.

(Net base prices per 100 ft. f.o.b. Pittsburgh in carload lots)

	Seamless Cold Drawn	Seamless Hot Rolled	Lap Weld Hot Rolled
1 in. o.d. 13 B.W.G.	$ 9.01	$ 7.82	....
1¼ in. o.d. 13 B.W.G.	10.67	9.26	....
1½ in. o.d. 13 B.W.G.	11.79	10.23	$9.73
1¾ in. o.d. 13 B.W.G.	13.42	11.64	11.06
2 in. o.d. 13 B.W.G.	15.03	13.04	12.38
2¼ in. o.d. 13 B.W.G.	16.76	14.54	13.79
2½ in. o.d. 12 B.W.G.	18.45	16.01	15.16
2¾ in. o.d. 12 B.W.G.	20.21	17.54	16.58
2¾ in. o.d. 12 B.W.G.	21.42	18.59	17.54
3 in. o.d. 12 B.W.G.	22.48	19.50	18.35
3½ in. o.d. 11 B.W.G.	28.37	24.62	22.15
4 in. o.d. 10 B.W.G.	35.20	30.54	28.66
4½ in. o.d. 10 B.W.G.	43.04	37.35	35.22
5 in. o.d. 9 B.W.G.	54.01	46.87	44.25
6 in. o.d. 7 B.W.G.	82.93	71.96	68.14

Extras for less carload quantities:

40,000 lb. or ft. or over	Base
30,000 lb. or ft. to 39,999 lb. or ft.	5%
20,000 lb. or ft. to 29,999 lb. or ft.	10%
10,000 lb. or ft. to 19,999 lb. or ft.	20%
5,000 lb. or ft. to 9,999 lb. or ft.	30%
2,000 lb. or ft. to 4,999 lb. or ft.	45%
Under 2,000 lb. or ft.	65%

CAST IRON WATER PIPE

	Pet Net Ton
*6-in. and larger, del'd Chicago	$51.00
6-in. and larger, del'd New York	49.00
*6-in. and larger, Birmingham	43.00
6-in. and larger, f.o.b. dock, San Francisco or Los Angeles	52.00
F.o.b. dock, Seattle	52.00
4-in. f.o.b. dock, San Francisco or Los Angeles	55.00
F.o.b. dock, Seattle	52.00

Class "A" and gas pipe, $3 extra 4-in. pipe is $3 a ton above 6-in.

Prices for lots of less than 200 tons. For 200 tons and over, 6-in. and larger is $42, Birmingham, and $50 delivered Chicago and 4-in. pipe, $45, Birmingham, and $54 delivered Chicago.

BOLTS, NUTS, RIVETS, SET SCREWS

Bolts and Nuts

(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

Per Cent Off List

Machine and carriage bolts:	
½ in. & 6 in. and smaller	65, 5 and 5*
Larger and longer up to 1 in.	60, 10 and 5*
1⅛ in. and larger	60, 5 and 5*
Lag bolts	60, 10 and 5
Plow bolts, Nos. 1, 2, 3 and 7	65, 5 and 5
Hot pressed nuts, and c.p.c. and t nuts, square or hex. blank or tapped:	
⅛ in. and smaller	65 and 5
9/16 in. to 1 in. inclusive	60, 5 and 5
1⅛ in. and larger	60 and 5

* Less carload lots and less than full container quantity. Less carload lots in full container quantity, an additional 10 per cent discount; carload lots and full container quantity, still another 5 per cent discount.

Semi-fin. hexagon nuts U.S.S. S.A.E.	
½ in. and smaller	65-5 70
9/16 to 1 in.	60-10 65
1⅛ in. and larger	60-5 60-5
In full container lots, 10 per cent additional discount.	
Stove bolts in packages, nuts attached	75
Stove bolts in packages, with nuts separate	75 and 12½
Stove bolts in bulk	85

On stove bolts freight is allowed to destination on 200 lb. and over.

Large Rivets

(½-in. and larger)

Base per 100 Lb.

F.o.b. Pittsburgh, Cleveland Chicago, Birmingham $3.40

Small Rivets

(7/16-in. and smaller)

Per Cent Off List

F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham 65 and 10

Cap and Set Screws

(Freight allowed to destination)

Per Cent Off List

Milled hexagon head, cap screws, 1 in. dia. and smaller	50 and 10
Milled square head set screws, case hardened, 1 in. dia. and smaller	75 and 10
Milled headless set screws, cut thread ¾ in. and smaller	68 and 10
Upset hex. head cap screws U.S.S. or S.A.E. thread 1 in. and smaller	65 and 10
Upset set screws, cup and oval points	73 and 10
Milled studs	57 and 10

Alloy and Stainless Steel

Alloy Steel Blooms, Billets and Slabs

F.o.b. Pittsburgh, Chicago, Canton, Massillon, Buffalo, Bethlehem.
Base price, $56.00 a gross ton.

Alloy Steel Bars

F.o.b. Pittsburgh, Chicago, Buffalo, Bethlehem, Massillon or Canton.

Open-hearth grade, base	2.80c.
Delivered, Detroit	2.90c.

S.A.E. Series Numbers	Alloy Differential per 100 Lb.
2100 (1½% Nickel)	$0.75
2300 (3½% Nickel)	1.55
2500 (5% Nickel)	2.25
3100 Nickel-chromium	0.70
3200 Nickel-chromium	1.85
3300 Nickel-chromium	3.80
3400 Nickel-chromium	3.20
4100 Chromium-molybdenum (0.15 to 0.25 Molybdenum)	0.55
4100 Chromium-molybdenum (0.25 to 0.40 Molybdenum)	0.75
4600 Nickel - molybdenum (0.20 to 0.30 Mo. 1.50 to 2.00 Ni.)	1.10
5100 Chrome steel (0.60-0.90 Cr.)	0.35
5100 Chrome steel (0.80-1.10 Cr.)	0.45
5100 Chromium spring steel	0.15
6100 Chromium-vanadium bar	1.20
6100 Chromium-vanadium spring steel	0.85
Chromium-nickel vanadium	1.50
Carbon-vanadium	0.85

These prices are for hot-rolled steel bars. The differential for most grades in electric furnace steel is 50c. higher. Slabs with a section area of 16 in. and 2½ in. thick or over take the billet base.

Alloy Cold-Finished Bars

F.o.b. Pittsburgh, Chicago, Gary, Cleveland or Buffalo, 3.40c. base per lb. Delivered Detroit, 3.50c., carlots

CORROSION & HEAT RESISTANT ALLOYS

(Base prices, cents per lb., f.o.b. Pittsburgh)

Chrome-Nickel

	No. 304	No. 302
Forging billets	21.25c.	20.40c.
Bars	25c.	24c.
Plates	29c.	27c.
Structural shapes	25c.	24c.
Sheets	36c.	34c.
Hot-rolled strip	23.50c.	21.50c.
Cold-rolled strip	30c.	28c.
Drawn wire	25c.	24c.

Straight Chrome

	No. 410	No. 430	No. 442	No. 446
Bars	18.50c.	19c.	22.50c.	27.50c
Plates	21.50c.	22c.	25.50c.	30.50c.
Sheets	26.50c.	29c.	32.50c.	36.50c.
Hot strip	17c.	17.50c.	23c.	28c.
Cold strp.	22c.	22.50c.	28.50c.	36.50c.

TOOL STEEL

High speed	67c.
High-carbon-chrome	43c.
Oil-hardening	24c.
Special	22c.
Extra	18c.
Regular	14c.

Prices for warehouse distribution to all points on or East of Mississippi River are 2c. a lb higher. West of Mississippi quotations are 3c a lb. higher.

British and Continental

BRITISH

Per Gross Ton f.o.b. United Kingdom Ports

Ferromanganese, export	Nominal
Tin plate, per base box	20s. 3d.
Steel bars, open hearth	£10 8s.
Beams, open-hearth	£10
Channels, open-hearth	£10 5s.
Angles, open-hearth	£10
Black sheets, No. 24 gage	£13
Galvanized sheets, No. 24 gage	£15 15s.

CONTINENTAL

Per Gross Ton, Gold £, f.o.b. Continental Ports

Billets, Thomas	Nominal
Wire rods, No. 5 B.W.G.	£5 10s.
Steel bars, merchant	£5 5s.
Sheet bars	Nominal
Plate ¼ in. and up	£5 7s.
Plate 3/16 in. and 5 mm.	£5 13s.
Sheets ⅛ in.	£5 9s. 6d.
Beams, Thomas	£4 18s.
Angles (Basic)	£4 18s.
Hoops and strip, base	£5 12s.

RAW MATERIALS PRICES

PIG IRON

No. 2 Foundry

F.o.b. Everett, Mass.	$22.75
F.o.b. Bethlehem, Birdsboro and Swedeland, Pa., and Sparrows Point, Md.	$22.00
Delivered Brooklyn	24.50
Delivered Newark or Jersey City	23.53
Delivered Philadelphia	22.84
F.o.b. Neville Island, Erie, Pa., Toledo, Chicago, Granite City, Cleveland and Youngstown	21.00
F.o.b. Buffalo	21.00
F.o.b. Detroit	21.00
Southern, delivered Cincinnati	21.06
Northern, delivered, Cincinnati	21.44
F.o.b. Duluth	21.50
F.o.b. Provo, Utah	19.00
Delivered, San Francisco, Los Angeles or Seattle	24.50
F.o.b. Birmingham*	17.38

* Delivered prices on southern iron for shipment to northern points are 38c. a ton below delivered prices from nearest northern basing point on iron with phosphorus content of 0.70 per cent and over.

Malleable

Base prices on malleable iron are 50c. a ton above No. 2 foundry quotations at Everett, Eastern Pennsylvania furnaces, Erie and Buffalo. Elsewhere they are the same, except at Birmingham and Provo, which are not malleable iron basing points.

Basic

F.o.b. Everett, Mass.	$22.25
F.o.b. Bethlehem, Birdsboro, Swedeland and Steelton, Pa., and Sparrows Point, Md.	21.50
F.o.b. Buffalo	20.00
F.o.b. Neville Island, Erie, Pa., Toledo, Chicago, Granite City, Cleveland and Youngstown	20.50
Delivered Philadelphia	22.34
Delivered Canton, Ohio	21.89
Delivered Mansfield, Ohio	22.44
F.o.b. Birmingham	16.00

Bessemer

F.o.b. Buffalo	$22.00
F.o.b. Everett, Mass.	23.75
F.o.b. Bethlehem, Birdsboro and Swedeland, Pa.	23.00
Delivered Newark or Jersey City	24.53
Erie, Pa., and Duluth	22.00
F.o.b. Neville Island, Toledo, Chicago and Youngstown	21.50
F.o.b. Birmingham	22.00
Delivered Cincinnati	22.11
Delivered Canton, Ohio	22.89
Delivered Mansfield, Ohio	23.44

Low Phosphorus

Basing points: Birdsboro, Pa., Steelton, Pa., and Standish, N. Y.	$26.50

Gray Forge

Valley or Pittsburgh furnace	$20.50

Charcoal

Lake Superior furnace	$25.00
Delivered Chicago	28.34

Canadian Pig Iron

Per Gross Ton

Delivered Toronto

No. 1 fdy., sil. 2.25 to 2.75	$26.50
No. 2 fdy., sil. 1.75 to 2.25	25.50
Malleable	26.00
Basic	25.50

Delivered Montreal

No. 1 fdy., sil. 2.25 to 2.75	$27.50
No. 2 fdy., sil. 1.75 to 2.25	27.00
Malleable	27.50
Basic	27.00

FERROALLOYS

Ferromanganese

F.o.b. New York, Philadelphia, Baltimore, Mobile or New Orleans.

Per Gross Ton

Domestic, 80% (carload)	$92.50

Spiegeleisen

Per Gross Ton Furnace

Domestic, 19 to 21%	$28.00
Domestic, 26 to 28%	33.00

Electric Ferrosilicon

Per Gross Ton Delivered; Lump Size

50% (carload lots, bulk)	$69.50*
50% (ton lots in 50 gal. bbl.)	80.50*
75% (carload lots, bulk)	126.00*
75% (ton lots in 50 gal. bbl.)	139.00*

Bessemer Ferrosilicon

F.o.b. Furnace, Jackson, Ohio

Per Gross Ton

10.00 to 10.50%	$30.50

For each additional 0.50% silicon up to 12%, 50c. per ton is added. Above 12% add 75c. per ton.

For each unit of manganese over 2%, $1 per ton additional. Phosphorus 0.75% or over, $1 per ton additional.

Base prices at Buffalo are $1.25 a ton higher than at Jackson.

Silvery Iron

Per Gross Ton

F.o.b. Jackson, Ohio, 5.00 to 5.50%	$24.50

For each additional 0.5% silicon up to 12%, 50c. a ton is added. Above 12% add 75c. a ton. The lower all-rail delivered price from Jackson or Buffalo is quoted with freight allowed. Base prices at Buffalo are $1.25 a ton higher than at Jackson.

Manganese, each unit over 2%, $1 a ton additional. Phosphorus 0.75% or over, $1 a ton additional.

Ferrochrome

Per Lb. Contained Cr., Delivered Carlots, Lump Size, on Contract

4 to 6% carbon	10.50c.*
2% carbon	16.50c.*
1% carbon	17.50c.*
0.10% carbon	19.50c.*
0.06% carbon	20.00c.*

Silico-manganese

Per Gross Ton, Delivered, Lump Size, Bulk, on Contract

3% carbon	$92.75
2.50% carbon	97.75
2% carbon	102.75
1% carbon	112.75

Other Ferroalloys

Ferrotungsten, per lb. contained W del., carloads, nominally	$2.00
Ferrotungsten, lots of 500 lbs. nominally	2.05
Ferrotungsten, smaller lots, nominally	2.10
Ferrovanadium, contract, per lb. contained V., delivered	$2.70 to $2.90†
Ferrocolumbium, per lb. contained columblum, f.o.b. Niagara Falls, N. Y., tons lots.	$2.25†
Ferrocarbontitanium, 15 to 18% Ti, 7 to 8% C, f.o.b. furnace carload and contract per net ton	$142.50
Ferrocarbontitanium, 17 to 20% Ti, 3 to 5% C, f.o.b. furnace, carload and contract, per net ton	$157.50
Ferrophosphorus, electric or blast furnace material, in carloads, f.o.b. Anniston, Ala., for 18%, with $3 unitage, freight equalized with Rockdale, Tenn., per gross ton	$58.50
Ferrophosphorus, electrolytic, 23-26% in car lots, f.o.b. Monsanto (Siglo), Tenn., 24%, per gross ton, $3 unitage, freight equalized with Nashville	$75.00
Ferromolybdenum, per lb. Mo. f.o.b. furnace	95c.
Calcium molybdate, per lb. Mo. f.o.b. furnace	80c.

*Spot prices are $5 per ton higher
†Spot prices are 10c. per lb. of contained element higher.

ORES

Lake Superior Ores

Delivered Lower Lake Ports

Per Gross Ton

Old range, Bessemer, 51.50%	$5.25
Old range, non-Bessemer, 51.50%	5.10
Messabi, Bessemer, 51.50%	5.10
Messabi, non-Bessemer, 51.50%	4.95
High phosphorus, 51.50%	4.85

Foreign Ore

C.i.f. Philadelphia or Baltimore

Per Unit

Iron, low phos., copper free, 55 to 58% dry, Algeria	12c.
Iron, low phos., Swedish, average, 68½% iron	12½c.
Iron, basic or foundry, Swedish, aver. 65% iron	11c.
Iron, basic or foundry, Russian, aver. 65% iron	Nominal
Man., Caucasian, washed 52%	31c.
Man., African, Indian, 44-48%	29c.
Man., African, Indian, 49-51%	31c.
Man., Brazilian, 46 to 48½%	28c.

Per Short Ton Unit

Tungsten, Chinese, Wolframite, duty paid, delivered	$19.50
Tungsten, domestic, scheelite delivered	$18.00 to $19.00
Chrome ore (lump) c.i.f. Atlantic Seaboard, per gross ton: South African (low grade)	$15.00
Rhodesian, 45%	19.00
Rhodesian, 48%	23.00
Turkish, 48-49%	23.00
Turkish, 45-46%	19.00
Turkish, 40-44%	16.00
Chrome concentrates (Turkish) c.i.f. Atlantic Seaboard, per gross ton: 50%	$24.00
48-49%	22.50

FLUORSPAR

Per Net Ton

Domestic washed gravel, 85-5, f.o.b. Kentucky and Illinois mines, all rail	$17.00 to $18.00
Domestic, f.o.b. Ohio River landing barges	18.00
No. 2 lump, 85-5, f.o.b. Kentucky and Ill. mines	18.00
Foreign, 85% calcium, fluoride, not over 5% silicon, c.i.f. Atlantic ports, duty paid	24.50
Domestic No. 1 ground bulk, 95 to 98% calcium fluoride, not over 2½% silicon, f.o.b. Illinois and Kentucky mines	31.50

FUEL OIL

Per Gal

No. 2 or diesel, f.o.b. Bayonne	4.125c.
No. 6, f.o.b. Bayonne	2.26c.
Del'd Chicago, No. 5 Bur. Stds.	3.25c.
Del'd Chicago, No. 6 Bur. Stds.	2.75c.
Del'd Cleve'd, No. 3 distillate	5.50c.
Del'd Cleve'd, No. 4 industrial	5.25c.
Del'd Cleve'd, No. 5 industrial	3.00c.
Del'd Cleve'd, No. 6 industrial	2.75c.

COKE

Per Net Ton

Furnace, f.o.b. Connellsville, Prompt	$3.75
Foundry, f.o.b. Connellsville, Prompt	$4.75 to 5.50
Foundry, by-product, Chicago ovens	10.25
Foundry, by-product, del'd New England	12.50
Foundry, by-product, del'd Newark or Jersey City	10.88 to 11.40
Foundry, by-product, Philadelphia	10.95
Foundry, by-product, delivered Cleveland	10.30
Foundry, by-product, delivered Cincinnati	9.75
Foundry, Birmingham	7.50
Foundry, by-product, del'd St. Louis industrial district	10.75 to 11.00
Foundry, from Birmingham, f.o.b. cars dock Pacific ports	14.75

This Week in Washington

(CONTINUED FROM PAGE 218)

these relations have meant in serving the interests of all parties, including the general public, I cannot refrain from expressing my profound concern for industry in this country if the examiner's recommendation to scrap such relations be approved by the board. If that is the way the National Labor Relations Act is to be applied it is small wonder that its amendment is being urged from every quarter throughout the country."

Rail Committee's RFC Loan Proposals May Become Law

WASHINGTON — Recommendations in the recent railroad management - labor committee report to the President which appear to be least controversial and may be enacted into law at the present session of Congress include those concerning more liberal terms for RFC equipment and maintenance loans. The committee recommended that the RFC be authorized to make 15-year 2 per cent equipment loans to the railroads up to the full cost of new equipment, to be secured by trust certificates, with suspension of payment on principal during the first five years. Unpaid principal, however, would have to be paid in semi-annual installments over the next 10 years. The present RFC interest rate is 4 per cent.

For maintenance loans, the committee urged the "greatest liberality with respect to rate of interest and for repayment." It was recommended that collateral should not be exacted nor repayment of principal demanded other than as a condition precedent to the payment of any interest upon bonds "which is contingent upon earnings or the payment of dividends." In order to promote loans the committee proposed legislation enlarging the power of the RFC to purchase or guarantee obligations. It suggested elimination of the present requirement that before equipment or maintenance loans can be made the RFC obtain ICC certification that the railroads are not in need of reorganization.

Other Recommendations

In addition to legislation to carry out these proposals it is believed there is a good prospect for favorable action on recommendations for setting up a reorganization court and for reimbursement by the Government of all costs for the reconstruction of railroad bridges or other facilities made necessary in connection with the improvement of navigable waters or the carrying out of flood-control or similar projects. Other recommendations, such as those for a transportation board, repeal of the long and short haul clause and of land grant rates, etc., are

"HALLOWELL" STEEL SHOP EQUIPMENT
Designed to aid production . . . . . .
. . . . . Built to last a lifetime

"Hallowell" Steel Stools

The one piece welded steel construction of "Hallowell" stools and chairs makes them last longer—an important item when you're considering profits.
You can get just what you need in a "Hallowell" for the line is most extensive, with a design adapted for use at any type of operation.
Write us for our catalog.

Fig. 1334
Pat. Applied for

"Hallowell" Steel Tool Stands

Moves easily wherever it's needed; a handy stand to have. Made in a variety of types for all purposes.

Fig. 705

"HALLOWELL" STEEL WORK BENCH

Skillfully designed and built for present day needs. Its steel top stays smooth as a surface plate, and steel legs hold it permanently rigid. Bolt holes in the feet make it easy to fasten to the floor and easy to move. All its parts are standard and interchangeable. Best of all the cost is reasonable. Full range of sizes to choose from.

Fig. 732
Pat'd and Pats. Pending
Drawer is extra

"HALLOWELL" STEEL TRUCKS

Fig. 754 Pat. Applied For

Made to withstand the toughest treatment. Their steel platform can't splinter—their welded construction assures permanently rigid joints. And, because the wheels have smooth bores or anti-friction bushings in hubs and casters, and are perfectly lubricated, they're much easier to handle. Write for Bulletin.

"HALLOWELL" FOREMAN'S DESK

Ideal for foreman's use. Right height . . . right incline to write on while standing. Large drawer with lock for holding valuable papers. Carried in stock for prompt deliveries.

Fig. 981 Pat. Pending

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BRANCHES
CHICAGO
ST. LOUIS
SAN FRANCISCO

highly controversial and doubt prevails that they will be written into law.

With a view to preparing for legislation, however, an omnibus bill covering recommendations of the committee already is being prepared. Representative Lea, Democrat of California, chairman of the House Committee on Interstate Commerce, has drafted the measure and will hold hearings on it. Chairman Wheeler, Democrat of Montana, of the Senate Committee on Interstate Commerce, has approved the idea of submitting an omnibus bill, and it is reported that the President is also agreeable to the plan, though none has indorsed the committee report; nor is there agreement among them on a program. Rather there is agreement to attempt a program of railroad rehabilitation and the bill would be used only as a rough draft and hearings held from which to frame a final bill, provided agreement can be reached in the end.

The Administration itself apparently is shying away from sponsorship of a fixed railroad program, and is insisting that the legislation be drafted by the House and Senate committees. It was stated that this is in line with the White House's new policy and a departure from the former common practice of the executive branch drafting its own legislation and having it rubber-stamped by Congress.

In connection with the recommendation for liberalized loans the management-labor committee report said an average of $1,000,000,000 a year can justifiably be expended in further modernizing and improving railroad properties, including acquisition of new equipment. This, it was stated, would be in addition to normal expenditures for maintenance.

"The resulting gain in employment would extend beyond the railroads to all those engaged in producing and manufacturing railroad supplies and materials," it was pointed out.

Meanwhile, President J. J. Pelley of the Association of American Railroads, in a statement summarizing the performance of the railroads in 1938, said:

"With the coming of the new year, railroad managements hope that early action will be taken by Congress and the state legislatures looking toward development of a national transportation policy which will place all agencies of transportation upon an equality in matters of regulation, taxation and subsidies; recognize railroads as a business entitled to the same chance to earn a living as any other business and enable the railroads to reestablish their credit."

Partly because of the serious financial condition of the railroads and partly because of the fact that the volume of traffic could be handled without difficulty with existing equipment, Mr. Pelley said, the railroads in 1938 installed only 16,266 new freight cars. He added, however, that the association estimates that if their financial condition would permit, the railroads of the United States could profitably install 100,000 new freight cars and 2000 new locomotives annually in the next five years in order to replace older equipment with the view of bringing about a further increase in operating efficiency. In trade circles it is estimated that this equipment would call for about 1,100,000 tons of steel annually, together with large requirements for castings.

Capital expenditures by the railroads in 1938 for equipment, roadway and structures and other improvements to property, amounted to $250,000,000 compared with $509,793,000 in the preceding year, Mr. Pelley said. This was contrasted with $794,000,000, the average annual capital expenditures from 1927 to 1930.

RFC loans to the railroads in the first 11 months of 1938 totaled $76,299,500, with repayments amounting to $9,651,669. RFC loans outstanding total $422,541,377. Of RFC loans totaling $613,425,739 so far disbursed, the railroads up to Dec. 1, 1938, had repaid $190,884,362.

Morgan Construction Workers Celebrate Mill Anniversary

EMPLOYEES of the Morgan Construction Co., Worcester, Mass., recently gave a banquet to the company's directors in celebration of the 50th anniversary of the first Morgan continuous rolling mill built for the steel industry by Charles H. Morgan, founder of the company.

Among the speakers was Governor-elect Saltonstall, of Massachusetts, who told the workers and plant officers that the chief need today is "more cooperation between the management and the people who work." The employees presented a hand-printed scroll to Paul B. Morgan, son of the founder and president of the firm.

In 1888 Charles Morgan supplied the first continuous rolling mill to the steel trade of America. Like many other New England industries his company, starting in a small way, grew to large proportions before his death in 1911.

65 Mills in 23 Years

During the first 23 years of the company, prior to Charles Morgan's death, 65 rolling mill plants were built under his direction. In the 27 years since Paul B. Morgan succeeded his father as president of the firm 117 rolling mills have been constructed. These mills have been introduced into practically all the steel producing countries, and examples of Morgan mills can be found in the United States, Canada, England, Wales, France, Germany, Belgium, former Austria, Russia, India and Australia.

The idea of continuous rolling originated with George Bedson of Manchester, Eng., who in 1862 built the first mill of this type. A few years later Charles Morgan, at that time general manager of the Washburn & Moen Co.—predecessor of the American Steel & Wire Co., went to England to study Bedson's mill. He purchased one for his concern and installed it in Worcester. This early mill embodied many crudities and imperfections which one by one were corrected and the mill made practical.

Other Men Contribute

The operation of all early mills necessitated much heavy manual labor. It was Charles Morgan's contention that this must be eliminated as a step toward greater safety as well as an aid to higher efficiency and increased production.

In 1890 Charles Morgan engaged Victor E. Edwards, in 1895 Elbert H. Carroll and four years later Jerome R. George. Working with the founder these three men contributed in an outstanding way to the development of continuous mills and to the design of the many necessary mechanical handling devices for disposal of the greatly increased outputs of steel made possible by continuous rolling.